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# SOCIOMETRY

*A Journal of Inter-Personal Relations*

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## C O N T E N T S

### INDUCTION, DEDUCTION, AND CAUSATION--

Stuart C. Dodd . . . . . 119

### STUDENT ATTITUDES TOWARD PARTICIPATION IN

THE WAR--E. T. Katzoff . . . . . 149

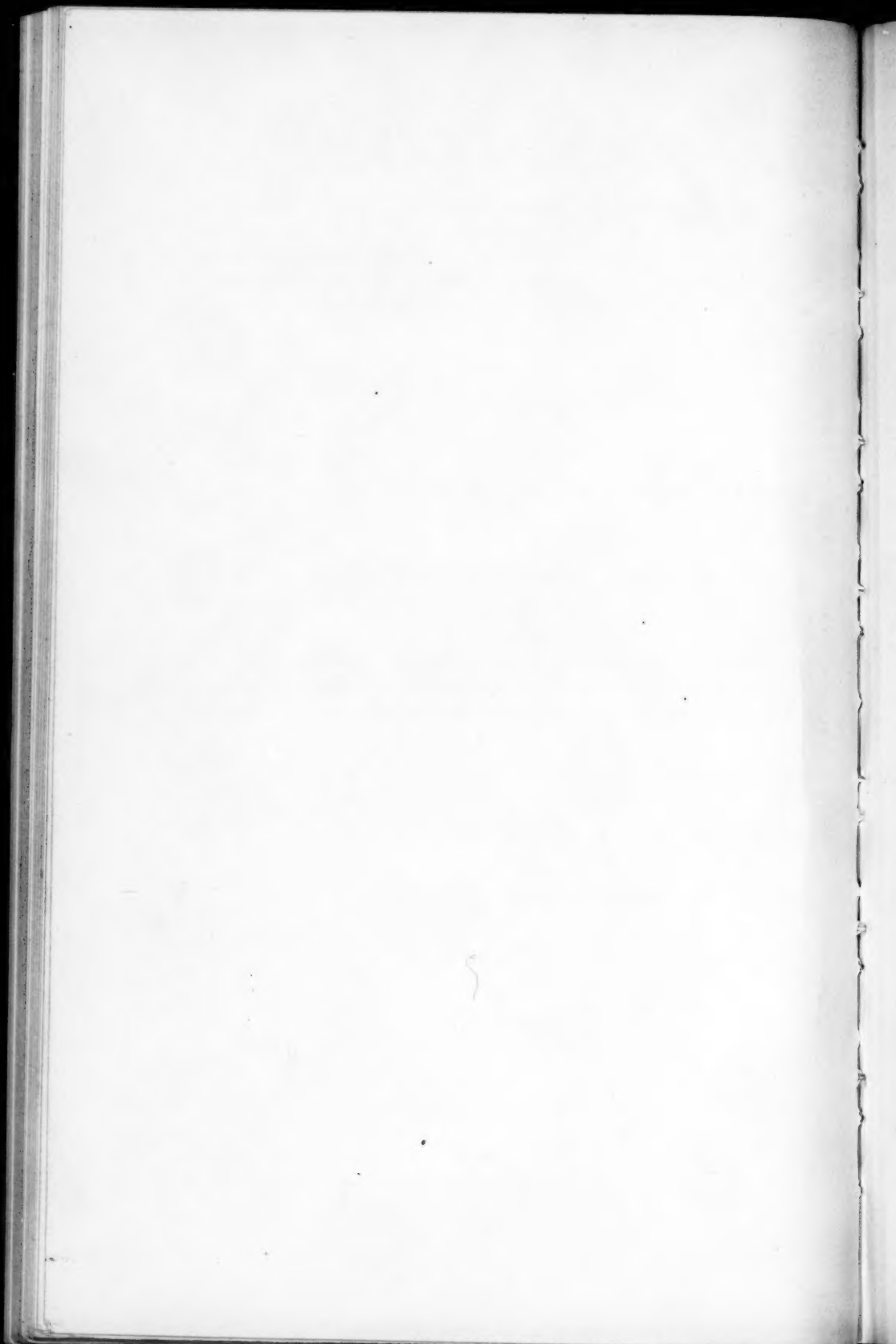
### AN EXPLORATORY ANALYSIS OF OPINION TRENDS WITH SPECIAL REFERENCE TO CONSCRIPTION

IN THE UNITED STATES--Jacob Goldstein . . . 156

ANNOUNCEMENTS. . . . . 182

BOOKS RECEIVED FOR REVIEW. . . . . 183

MAN IS THE MEASURE--Read Bain. . . . . 184



## INDUCTION, DEDUCTION, AND CAUSATION

An Operational Redefinition with Application to Sociometry

by

Stuart C. Dodd

American University of Beirut

Although modern science depends chiefly on induction from facts to theories and laws, yet the procedure of inducing is often more of an art than a science. Can the procedure for inducing valid generalizations in sociometry be communicated to a graduate student by definite rules or only by experience under a master researcher? Can "inducing" be so defined that the student can then start inducing reliably? Is there any operational definition of "induction" which will specify the procedure and the formal materials so objectively that the graduate students' inductions will be reliably close to those of more experienced researchers?

Inducing is commonly thought of as "generalizing from particulars to a principle," "discovering a regularity in phenomena," "finding a common factor in a set of observations," "inferring about a universe from knowledge of a sample," and similar phrases. But an operational definition would go further in stating the procedure, in telling the student how to go about such "generalizing," "discovering," "finding," or "inferring."

The first methodological hypothesis advanced in this paper is that, "induction" can be thus operationally defined to a large extent in terms of certain statistical formulae.✓

✓ It may be noted that this follows up Feigl's conclusion that, "The principle of induction is not a proposition at all. It is rather a principle of a procedure, a regulative maxim, an operational rule" (italics ours), Feigl, H., "The Logical Character of the Principle of Induction," *Jour. Phil. Sci.*, Vol. I, No. 1, Jan. 1934, p. 20-29.

To start, Mill's five classic canons for the induction of causation may be translated into correlation formulae. His method of Concomitant Variations is obviously only an archaic synonym for the modern calculation of a correlation coefficient or ratio. "Whatever phenomenon varies in any manner whenever another phenomenon varies in some particular manner, is either a cause or an effect of that phenomenon, or is connected with it through some fact of causation."<sup>2</sup> The statistical formulae for correlation, such as  $r_{12} = \sum x_1 x_2 / N$ , specify the procedure to compute the particular form of correlation index that is appropriate to the data. As the computation of these formulae has high reliability when computed by different persons, they are operational definitions,<sup>3</sup> measuring the precise degree of concomitant variation.

Mill's Method of Differences has been restated as "When the addition of an agent is followed by the appearance, or its subtraction by the disappearance, of a certain event, other circumstances remaining the same, that agent is the cause of the event." Let the presence and absence of an indicator of the agent be symbolized by  $1X$  and  $0X$  respectively, and let the appearance and disappearance of the "certain event" by  $1Y$  and  $0Y$ . Cross-classifying these in the usual correlation scattergram, which is here one of four cells only, gives

	$0X$	$1X$
$1Y$		+
$0Y$	+	

If the agent and event occur together, a tally in the upper right cell records this observation; while if they are both absent in an observed situation, a tally in the lower left cell records this fact. Tallies exclusively in those two diagonal cells denote perfect correlation ( $r = 1.00$ ). In proportion as some tallies might occur in the other two cells, the correlation would be imperfect ( $r < 1.00$ ) and the causation incomplete. The wording of Mill's canon implies here a single agent in the expectation of perfect correlation. This case of a single sole cause of an event is exceptional as most events have plural causes yielding a multiple correlation with the event. Note that

<sup>2</sup>The wording of Mill's canons here is taken from Sellars, R. W., "The Essentials of Logic," Houghton Mifflin, 1925.

<sup>3</sup>For an operational definition of operational definitions, see a paper with this phrase as title by the author in the *American Journal of Sociology*, Jan. 1943.

a correlation and a time sequence between prior agent and its event are clearly implied as part of the meaning of causation.

In Mill's Joint Method of Agreement and Difference, the partial Method of Agreement is combined with the Method of Difference. (The Method of Agreement involves observing many diverse instances which have in common only the combined occurrence of  $^1X$  and  $^1Y$ . This merely increases the number of tallies in the upper right cell of the correlation scattergram above and helps to make the correlation more reliable as it is derived from a larger sample of more diversified conditions.) Take as an example, Moreno's hypothesis that redistributing the membership of groups according to their interpersonal preferences (as indicated by a sociometric test) will cause better adjustment (as objectively shown by such indicators as increased output, if the groups are production groups, or fewer attempted escapes in institutional cottages, or higher scores in self-ratings of contentment, etc.)

By the Joint Method of Agreement and Difference in Mill's terms, each of the two correlated variables is dichotomized, i.e. crudely observed as all or none. Thus  $^0X$  denotes the groups before rearranging members and  $^1X$  denotes them after rearrangement on the basis of a Moreno sociometric test. This indicates the absence or presence of the hypothesized causal agent. Then  $^0Y$  denotes "unchanged output" while  $^1Y$  denotes "improved output." The hypothesis that sociometric-based rearrangement of group membership causes better adjustment (in the situations as observed) is, then, proved to the extent of the correlation coefficient that is found. Of course, all-or-none observing is primitive and should be made more accurate by observing each variable in many degrees. This becomes the Method of Concomitant Variations. Thus increase in the cohesion index  $I_C$  measures

$I_C$  One index of cohesion,  $I_C$ , is the percent defined as  $(100) \times$  [the number,  $\sum (+1)$ , of interperson reports such as "I am attracted to person A;" minus the number,  $\sum (-1)$ , of reports such as "I dislike person A"]  $\div$  (the total number of interperson relations whether of attraction, indifference, or repulsion).  $I_C = 100 [\sum (+1) + \sum (-1)] / n$  (Eq. 1) is the number of permutations of  $N$  persons taken two at a time, and  $n$  is  $N^2 - N$ . It is the number,  $N \times N$ , of cells in the interperson matrix when the self-relations in the  $N$  main diagonal cells are deducted. If all reactions are attractions,  $I_C = 100$ ; if they average to indifference,  $I_C = 0$ ; while if they are all repulsions,  $I_C = -100$ .

the cause in degrees; and the increase in output, or contentment rating, or decrease in escapes, measures specific observable effects in degrees.

Mill's fifth method, that of Residues, reads, "Subduct from any phenomenon such part as is known by previous inductions to be the effect of certain antecedents, and the residue of the phenomenon is the effect of the remaining antecedents." In letter symbols the antecedents A, B, . . . L, M, N have been observed and also the phenomenon composed of parts O, P, . . . V, W. If from previous inductions, A, B, . . . L have been identified as causing "such part" of the effect as O, P . . . V, then by subtracting these knowns from the fuller sets of observed antecedents and effects, leaves antecedents M, N as causes of W. This assumes perfect correlation between the whole antecedent set A . . . N and the whole phenomenon effect, O . . . W, as otherwise there will be a loophole for further residual and undetermined causation. In correlational terms this Residues method means that the correlation of the A . . . L antecedents with the part O . . . V of the phenomenon is perfect, i.e.

$$r(A, B, C \dots L)(O, P \dots V) = 1.00$$

or since this is unlikely to occur in practice, that the correlation of the A . . . L antecedents with the whole phenomenon O . . . W is less than perfect. This deficit from perfect correlation is the residual correlation and is measured by the coefficient of alienation,  $k$ , defined by  $k = \sqrt{1 - r^2}$  (Eq. 2). Hence the method of residues can be applied and its adequacy exactly measured by determining whether the addition of the residual antecedents M, N account for the deficit from perfect correlation. This is better stated as finding how much closer to perfection the correlation becomes on including M, N in the antecedent set of variables. ✓

John Stuart Mill's five canons for induction of causation are thus seen to be somewhat primitive rules for which modern

✓ If the correlation  $r(A, B \dots M, N)(O, P, Q \dots V, W) = 1.00$  (Eq. 3) within standard error limits and when corrected for attenuation, the hypothesis of residual causation is fully proved. The formula for this correlation might be that for the correlation of two sums, for a first approximation, or, for more exact work with optimal weights for every antecedent and part of the effect (A, B . . . L, M, N, O, P . . . V, W), the complicated matrix formula for double multiple correlation developed by Hotelling in "The Most Predictable Criterion," Jour. Educ. Psych., Vol. XXVI, No. 2, Feb. 1935, p. 139-142.



statistical formulae are much more precise statements. These formulae are more versatile for dealing with the usual imperfect data and with the case of inter-correlated causes instead of the uncorrelated causes assumed by Mill. They are more objectively communicable and hence more reliable procedures.

Four other types of induction have thus far been explored in searching for evidence for and against this hypothesis of re-defining induction in terms of statistical formulae. These types of induction are:

1. A class induced, or, better, abstracted, from its observed members; a concept generalized from many particular instances.
2. Relations between classes.
3. Statistical induction from a sample to its universe.
4. Temporal induction forecasting from the recent past to the near future.

Suggestions of other types of induction, especially those which do not seem to be analyzable into statistical formulae, are invited as these will be more rigorous tests of the hypothesis.

Before these types of induction can be translated into statistical formulae the concepts of correlation and of the statistical moments must be broadened and defined in a more generalized formula than is current in statistics.

The derivation and fuller exposition of this highly generalized formula for correlation which has been christened the "degree of equivalence index,  $Q_{12}$ " is reported elsewhere.<sup>✓</sup> Briefly, it is a basic formula defined as a statistical moment with specified but varying units, origins, variables, and exponents, so that as these vary in specified ways the formula becomes the rectilinear correlation coefficient or the twin curvilinear correlation ratios, the four-point correlation or biserial correlation, rank correlation, or the contingency coefficient for qualitative classes, the common elements correlation, the coefficient of similarity, chi square, or the analysis of variance and covariance. Hitherto, all these many forms of correlation have lacked a unifying master formula of which they are all variants.

✓ In a paper in preparation to be submitted to the Journal of the American Statistical Association. This reference will be brought up to date before publication.

The equivalence index  $\forall$  seems to be such a unifying master formula for correlation.

This equivalence index includes as special cases several types of products which are not usually thought of as correlation at all. Thus when the population is one, the index simplifies to be the ordinary arithmetic product of two numbers which extends the concept of correlation of variables to cover the relation of two constants also. When further the two exponents in the formula for the index shift from unities to zeros, the equivalence index becomes identical with the logical product of two classes or the conjunction of two propositions in logic and thus extends the

$\forall$  The equivalence index is briefly derived and defined as follows:

Let  $X_1$  and  $X_2$  denote two variables (whether qualitative, i.e. attributes, or quantitative).

Let  $O$  denote the origin (at zero, or the mean, or elsewhere).

Let  $U$  denote the unit (class-intervals, sigmas, or other).

Let  $E$  denote the exponent (i.e. 0, 1, 2, 3, etc.).

Let  $N$  denote the frequency (i.e. population of the sample in which  $X_1$  and  $X_2$  are observed).

Then a "developed variable,"  $Z$ , as corrected for origin, units, and power, is defined by :

$$Z = (X - O)^E / U \quad \text{Eq. 4}_a$$

Let the product moment of two developed variables define a third raw variable,  $X_3$  :

$$X_3 = \sum Z_1 Z_2 / N \quad \text{Eq. 4}_b$$

Then the generalized statistical moment is  $X$  developed, namely:

$$Z_3 = (X_3 - O_3)^{E_3} / U_3 \quad \text{Eq. 4}_c$$

This general formula subsumes as special cases over half the formulae of statistical textbooks, the remaining formulae being mostly functions of  $Z_3$  in further combinations, according to the preliminary survey of the field cited above. Whenever the origin and units are so chosen as to express the relation of the two variables on a scale ranging from -1 to +1, i.e. whenever  $Z_3$  is expressed as a proportion of unity, it may be called the "equivalence index," symbolized by  $Q_{12}$ .  $Q_{12}$ , properly applied, is a highly generalized formula for all types of correlation.

This  $Z_3$  statistic (and its subcase,  $Q_{12}$ ) is a deduction from the more general formula defining the "S-theory" of dimensional sociology, as developed in the author's *DIMENSIONS OF SOCIETY* (Macmillan, 1942, p. 944).



concept of correlation from quantities to cover qualities also. For the logical product, as explained below, can be conceived as an unquantified, or purely qualitative, statement of correlation of two classes. Alternatively stated, correlation can be conceived as the metricized logical product.

In case sociometrists are not familiar with the logical product as defined and used in modern symbolic logic, it is defined as any class which is jointly characterized by two factor classes. Thus the logical product of "female" and "human" is "woman," for "woman" is jointly characterized by being both "female" and "human." The logical product of the class "persons" and the class "rejected" is the class of "rejected persons" in a sociometric test. The logical factors of the product "sociometry" are "social, or interhuman" and "measurement," for sociometry is etymologically "that which is jointly characterized by 'the social' and the 'measured.'" Thus adjectives qualifying a noun or adverbs qualifying a verb form logical products. The logical product is the overlap in meaning or the common membership of two classes. It is diagrammed as the common area of the two overlapping circles which represent the two factors,  $X_1$   $(X_1 X_2)$   $X_2$ . The product of class  $X_1$  and class  $X_2$  is usually written  $X_1 \cap X_2$  in symbolic logic, though by letting the zero exponent denote a class, or a quality, the ordinary operational symbols of mathematics can be used, so that a logical product becomes symbolized by  $X_1^0 X_2^0$ .

This is the special case of the equivalence index where the exponents and origins are zeros and where the units and the population are unity, so that:

$$\begin{aligned} Z_3 &= \left[ \frac{\sum \frac{(X_1 - O_1)^{E_1}}{U_1} \frac{(X_2 - O_2)^{E_2}}{U_2}}{N - O_3} \right] E_3 / U_3 \\ &= \left[ \frac{\sum \frac{(X_1 - 0)^0}{1} \frac{(X_2 - 0)^0}{1}}{1 - 0} \right] 0/1 \\ &= \sum_{i=1}^1 X_1^0 X_2^0 / 1 = X_1^0 X_2^0 = Q_{12}^0, \text{ the qualitative} \end{aligned}$$

equivalence index

(Eq. 5)

The invention of the notation of letting the zero exponent denote an unquantified quality, a logical class, has great potential utility in unifying the notation and operational rules of symbolic logic with those of mathematics; qualitative logical

Of course, a logical product may have more than two factors, as when a person is characterized as popular, intelligent, a good student, and female making her the logical product of five factors, which are person and the four qualifying attributes. Now if the cohesion index (see above) of another person is also above the mean, if his intelligence were above the mean, and if he had musical ability he would be symbolized from this record as the product of these four factors. Similarly, a third person might be observed with a super-average cohesion index and three new traits and he would be their joint characterization in the product of five factors. Now observable entities in the world are usually such products of many factors. When we find a common factor such as "popularity" running through the three observed persons above, it becomes a logical class with those persons as members of the class "popular." This finding a common factor in observed entities is abstracting a class or inducing a concept from particular instances. This simple qualitative form of induction, better known as abstracting, consists in analyzing out a common factor from an aggregation of logical products. These logical products in turn are the simple case of the equivalence index.  $\nabla$

classes and quantitative mathematical variables become combinable in the same equations, all subject to one set of rules. This enables solving for either quantitative or qualitative unknowns in ways hitherto impossible.

$\nabla$  In algebraic terms, the index  $Q_{12}^0$  in this case has zero exponents and origins.

The units chosen are  $U_1 = U_2 = 1$ , and  $U_3 = 1/N$  in order to degenerate the mean product into the sum of products. Thus  $Z_3$  becomes:

$$Z_3 = \sum_{I=1}^N X_1^0 X_2^0 \quad (\text{Eq. 6a})$$

which is the logical sum of the  $N$  different logical products  $X_1^0 X_2^0$ . That these products are different means that their factors are not identical. Thus  $X_1$  may represent a product of varying subfactors such as  $X_{1A}, X_{1B}, X_{1C}, \dots$ . In this case writing the sum of products in one of its many possible more expanded forms gives:

$$\begin{aligned} \sum_{I=1}^N X_1^0 X_2^0 &= X_{1A}^0 X_{1C}^0 X_2^0 + X_{1C}^0 X_{1D}^0 X_2^0 + X_{1B}^0 X_2^0 + \dots + X_{1N}^0 X_2^0 \\ &= X_2^0 (X_{1A}^0 X_{1C}^0 + X_{1C}^0 X_{1D}^0 + X_{1B}^0 - \dots + X_{1N}^0) \quad (\text{Eq. 6b}) \end{aligned}$$

In this example of abstracting, Mill's method of Agreement may be illustrated. If the persons who are multi-factor products here were all members of one class called the "effect," say the class of "well-adjusted" persons as indicated by some rating scale, then the finding that every member of this "well-adjusted" class agreed in having the "popularity" factor occurring with it suggests a causal relation between "popularity" and being "well-adjusted." The equivalence index here when written out in expanded form would show the logical product "well-adjusted and also popular" as a common double factor in every observed multifactor product.

The next type of induction explored is that of relations between quantitative variables. Thus, for example, Engel's Law is an induction stating a relation between size of family income and percent of it spent on food, on clothing, and on luxuries. This relation for food, for example, is more precisely expressed as a negative correlation, the calculation of which is the best procedure for inducing the degree to which the percentage spent for food decreases as income increases.<sup>19</sup>

In general, any relation between variables is expressed in some sort of equation (or inequality). Thus the law of gravity equates the force of gravity,  $g$ , to the product of two masses

This expanded form shows the common qualitative factor to be the logical class, or statistical attribute,  $X_2^0$ , embedded in the set of  $N$  logical products.

<sup>19</sup> A deeper issue lies here. In one study Ogburn reports the relation of the percent spent for clothing,  $X_c$ , in the equation

$$X_c = 5.29 + .0034x_i + .449x_n \quad (\text{Eq. 7})$$

where  $x_i$  = size of family in calory requirement units and  $x_n$  is income. Such an empirical equation expresses the form of relation in some regression line, while the correlation expresses the degree to which all observed cases conform to it. Correlation formulae then do not induce the form of such an equation of relation. This form of equation is determined by calculating statistical moments in curve fitting technics and then determining by a chi square test the probability of this curve being a good fit. Both chi square and probability are forms of statistical moments so that they represent a subform of the  $Z_3$  statistic. The statistical moments specify a procedure for determining the form as well as the amount of the relation between variables.

and the inverse square of their distance apart,  $g = m_1 m_2 / d^2$ . (Eq. 8) This is but a statement of correlation between the left hand member of the equation and the right hand member. The correlation is slightly less than unity under atmospheric conditions of air friction but is unity in a vacuum. Every exact empirical equation is thus but a regression equation when correlation is unity. Then the estimated value of one variable,  $X_2$ , from knowledge of the other is not an approximation but the exact true value. The regression equation,  $X_1 = rX_2$ , where  $X_1$  is the force of gravity in sigma units and  $X_2$  is the  $m_1 m_2 / d^2$  ratio in sigma units would become  $X_1 = X_2$  whenever  $r = 1$ . In the case of definitional equations of variables where the left hand member is the definiendum and the right hand member is its definition, a correlation of unity is assumed by definition in asserting the two sides of the equation to vary together and to be always equal. Thus the induction of equations relating variables reduces to some amount of correlation which is a subcase of the equivalence index and so confirms our hypothesis a little further.

The third type of induction explored thus far is that of sampling theory in statistics — the induction that what was found for a sample will tend to hold for its universe. Essentially, this type of inductance assumes a high equivalence index between the findings in the sample and in its sampled universe. This index is usually not calculable but is inferred from previous experience, general plausibility, or even wishful thinking. Towards operational rules to insure that this index be high the technics of representative sampling, random sampling, repeated sampling, standard errors, and fiducial limits have been developed by statisticians. These all constitute calculating various appropriate forms of the equivalence index. Thus in representative sampling the proportions in relevant classes in the sampled universe are known and duplicated in the sample. A correlation measures how closely the series of proportions in the sample duplicates those proportions in the universe. Or instead of proportions, which are always means of all-or-none variables, the ordinary arithmetic means in each characteristic of a series in the universe may be duplicated in the sample and correlation may be used to measure the excellence of this duplication. If instead of a series of many means, one mean (or any other constant) in the universe is to be duplicated in the sample, the appropriate form of the equivalence index may be a ratio of the smaller constant to the larger.  $\sqrt{}$  This ratio approaches its maximum at

unity when the mean or other index from sample and from universe is the same. This measures perfect equivalence in this induction.

In random sampling the relevant indices of the universe are not known and hence cannot be duplicated in the sample. Suppose the structure of a sample group is being measured by inter-person attitude tests and generalizing to a more inclusive group is desired. Selection of the sample by random technics of choosing every tenth name in an alphabetical list, etc. is intended to prevent bias. Bias is simply the existence of a variable which is correlated with the variable studied and which is unrepresentatively sampled. Thus, in the group structure, race differences of negro and white might correlate with the inter-person attitudes and if the races in the sample were unrepresentative of the larger group sampled, i.e. their proportions did not agree closely, then the inter-person attitudes found would be biased to that extent. Randomizing technics seek to achieve high-equivalence

✓ This ratio is the special case of the equivalence index appropriate to measure the agreement of two constant quantities. In  $X$  here, the unit in which the  $X_1$  and  $X_2$  are expressed is the larger of the two, so that  $U_1 = U_2 = X_2 > X_1$ . The origins are at zero and the exponents are unities. This can be shown to be equivalent to standard deviation units in the case of constants. This unit keeps the index to a 0 to 1.00 range and measures the degree of equivalence as a proportion of unity.

$$Q_{12} = \left[ \sum_1^N \frac{(X_1 - 0)^1}{X_2} \frac{(X_2 - 0)^1}{X_2} / N - 0 \right] 1/1 = \sum_1^N \frac{X_1}{X_2} / N = \frac{{}^1X_1}{{}^1X_2} \quad (\text{Eq. 9})$$

Here  ${}^1X_1$  and  ${}^1X_2$  are denoted by the pre-superscript to be each a single value, i.e. a constant in the situation recorded, since each was a variable summed for but one instance, for but one particular value.

Perfect equivalence of the two constants is reached when  $Q_{12} = 1$ . so that  ${}^1X_1 = {}^1X_2$  which corresponds to perfect correlation of two frequency variables.  $Q_{12}$  is here equivalent to the regression coefficient and enables perfect estimation of  ${}^1X_1$  from  ${}^1X_2$  since the equivalent for constants of the regression equation,

$${}^1X_1 = Q_{12} {}^1X_2$$

becomes

$${}^1X_1 = 1. {}^1X_2$$



between sample and universe by controlled use of chance.

In repeated sampling, two or more samples are compared and their degree of agreement is measured. Thus two similar groups may be measured and the means compared by the  $Q$  in ratio form described above. Or, for another form of sampling, two samples of behavior in one population of persons may be taken as in calculating the reliability correlation coefficient between two forms of a test or between odd numbered and even numbered items of one test of attitudes. This reliability is but a special case of the equivalence index. By the Spearman-Brown prophecy formula which has been experimentally checked and verified, the degree of increased agreement can be calculated that is to be expected from doubling, tripling, quadrupling, or, in general, increasing the sample of behavior  $n$ -fold in amount. The Spearman-Brown prophecy formula is a function of reliability correlation coefficients and measures the improvement in induction as the behavior sample grows larger approaching the size of the universe sampled or even approaching infinity as in the formulae for correcting a correlation for attenuation.

In inducing from samples by the use of standard error formulae and fiducial limits, still other forms of the equivalence index are involved. Every formula for the standard error of any index is derived as the standard deviation of a distribution each member of which is one value of that index from one sample of population. But every standard deviation is a special case of the generalized equivalence index.<sup>12</sup>

This standard error is then interpreted in probability terms which state the probability of a specified degree of equivalence between sample and universe sampled. But probability is another case of the equivalence index.

<sup>12</sup> When in the formula for  $Z_3$ ,  $X_1 = X_2$ , and the mean is its origin and  $E_3 = .5$ ,  $Z_3$  becomes a standard deviation, as follows:

$$Z_3 = \left[ \frac{\sum \frac{(X_1 - M_1)^2}{1}}{1} \frac{(X_1 - M_1)^2}{1} / N^{-1} \right]^{.5} = \left[ \sum (X_1 - M_1)^2 / N \right]^{.5} \\ = \sqrt{\sum X_1^2 / N} = \sigma_1. \quad (\text{Eq. 10})$$

When the index from the sample is divided by its standard error the critical ratio is found and its probability is then read off from a table of normal probabilities if the sample was large, or from other tables based on Fisher's distributions if the sample

Therefore, all these forms of statistical induction from sample to universe sampled are operationally specified by the appropriate forms of the equivalence index (which, of course, must be competently applied).

A fourth form of induction is from a past sample or series of observations to their future continuation. This is forecasting a time series. Since the successive observations in time are usually thought to be correlated, such a time series is not a random sample. The induction here is usually made by curve fitting techniques which analyze the past trend line and its superposed seasonal or other cycles and project all these on into the future. More exact results may often be obtained by breaking down the time series into several component series, projecting each separately and combining their result. This allows for changing factors some waxing, others waning, in differing accelerations and for differing durations. As both these curve fitting techniques and combining of factors in multiple correlation predictions depend on the formulae for various statistical moments, these temporal inductions would seem to be operationally defined in terms of these statistical procedures.

Our conclusion from this partial exploration of the forms of induction is that, as a student masters the content in his field, he can best be taught to induce new generalizations by studying statistics and symbolic logic. These courses tell him when and how to apply such formulae as the equivalence index in their many variant forms adapted to the data and purpose in hand. Such indices are brief operational definitions in that they reliably specify the procedure for inducing in sociometry as in any other field.

was small. The probability,  $p$ , is again another form of  $Q$ , namely, when  $X_2 = 1$  so that  $Q$  simplifies to a first statistical moment and the units are all-or-none points,  ${}^1O_X$ , so that

$$Q = \left[ \frac{\sum \frac{({}^1OX_1 - 0) {}^1}{1} \cdot \frac{(X_2 - 0) {}^0}{1}}{N} \right] 1/1 = \sum {}^1OX_1 / N$$

$$= \frac{\sum {}^1X_1}{\sum {}^1X_1 + (N - \sum {}^1X_1)} = p, \text{ a proportion (Eq. 11)}$$

This proportion is the ration of "all" cases,  ${}^1X_1$ , i.e. "favorable events" to the sum of these plus the "none" cases,  ${}^0X_1$ , i.e. unfavorable events.  $N$  is the total number of cases derived by counting the  ${}^1X$  and the  ${}^0X$  cases.

However, there may be other forms of inducing in sociometry which we have not explored and which will refute, modify, or limit this "equivalence index" hypothesis of induction.


## II Deduction

Induction has been largely reduced to statistical formulae; can deduction be similarly reduced or translated? Can the process of deducing be reliably communicated to students partly by a course in Statistics, or only by a course in Logic?

The second methodological hypothesis advanced in this paper is that deduction, from a statistician's point of view, is largely an immense elaboration of pre-quantitative correlation indices, the qualitative forms of the "equivalence index,"  $Q$ . This hypothesis includes as a corollary the assertion that the syllogism, classic in the logic of Aristotle and the mediaeval schoolmen, is but a primitive special case of the regression equation. The hypothesis implies that modern symbolic logic can be further systematized with statistical theory. These somewhat large claims need more careful and qualified exploration.

Examine, first, the classic syllogism in a simple form:

All men are mortal	major premise
Socrates is a man	minor premise
Therefore Socrates is mortal	Conclusion

In the symbolism of modern logic, let  $P$  denote the class "men," let  $M$  denote the class "mortal," let  $P$  denote Socrates, a particular member of the class  $P$ , and let the inclusion symbol,  $\subset$  denote "is included in" so that the statement  $P \subset M$  says that all members of the class  $P$  are included in the class  $M$  (which may have additional members who are not in class  $P$ ). In diagram form, inclusion means one circle wholly enclosed in a larger circle 

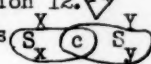
Then the syllogism can be stated in letter symbols as:

$P \subset M$	$P$ is included in $M$
$P \subset P$	$P$ is included in $P$
$\therefore P \subset M$	Therefore $P$ is included in $M$

Before this can be restated as a regression equation, the appropriate subform of our equivalence index,  $Q$ , must be brought clearly to mind. This appropriate subform for all class theory in logic and for all logical products is the "common elements correlation," explained as follows: If an observed frequency variable,  $X_1$ , is the sum of a number of small independent elements, or sub-variables



of which a number,  $c$ , of elements are also elements in a second observed frequency variable,  $X_2$ , and the remainder,  $S_1$  in number, are elements specific to  $X_1$  alone; and if  $X_2$  is similarly composed of the  $c$  elements plus others,  $S_2$  in number, which are specific to  $X_2$  alone, then the correlation coefficient between  $X_1$  and  $X_2$  is the geometric mean of two proportions. Each of these two proportions which will be called  $r'$  and  $r''$  is the proportion that the common elements,  $c$ , are of all the elements in one variable. The correlation is thus an average proportion of common elements.<sup>13</sup>

Thus for a sociometric application, if two groups,  $X$  and  $Y$ , of persons, where some persons,  $c$  in number, are members of both groups, while other persons,  $S_x$  in number, are members of group  $X$  only and still other persons,  $S_y$  in number, are members of group  $Y$  only, then in the long run when the two groups have been measured in a series of characteristics the series of group  $X$  will correlate with the series of group  $Y$  in proportion to the overlapping membership of the groups as specified by Equation 12.<sup>14</sup> This formula is diagrammed by overlapping circles as  where each area measures the number of elements in that area as labelled. In case each variable has the same number of elements so that the number of specific elements in both are

<sup>13</sup> Thus  $X_1$  is composed of  $c + s_1$  elements and  $X_2$  is composed of  $c + s_2$  elements. Then:

$$r_{12} = \sqrt{\frac{c}{c+s_1} \cdot \frac{c}{c+s_2}} = \sqrt{r'_{12} r''_{21}} \quad (\text{Eq. 12})$$


This formula is that case of  $Q$  (Eq. 4) which is derived by letting the  $X$ 's each denote a sum of  $c + s$  independent elements or sub-variables, in  $o$  units, so that

$$Q_{12} = \left[ \frac{\left( \frac{c+s_1}{\sum e} - N_{\sum e} \right)^2}{\sigma_{\sum e}^2} \frac{\left( \frac{c+s_2}{\sum e} - N_{\sum e} \right)^2}{\sigma_{\sum e}^2} / N^{-o} \right]^{1/2}$$

which when expanded by the operations indicated by the formula simplifies to Equation 12.

<sup>14</sup> Strictly this will be a minimum correlation. If the persons interact with each other they may produce further correlation as then they are not independent elements as assumed in Equation 12.

equal, the correlation simplifies to the simple proportion of common elements.<sup>15</sup>

A special case of this common elements correlation which is extremely important in logic is where one variable wholly includes the other. If Y has no specific elements, its members are the common members only and it is entirely a part of X.<sup>16</sup> The circle diagram is here . This is the same diagram as for logical inclusion,  $Y \subset X$  above, except that the logical statement is unquantified.  $Y \subset X$  says that Y is included in X but does not say anything about their relative sizes more than the mere assertion that X is the larger or more inclusive class. Equation 12b, however, quantifies this qualitative assertion as by measuring the relative number of members of Y and X and stating this in their ratio,  $\frac{c}{c+s}$ . Thus this case of the common elements correlation measures precisely logical inclusion. Consequently, the syllogism above, if quantified, would be a series of three correlations such as Equation 12b.<sup>17</sup>

The last correlation would go further than the mere logical assertion that Socrates is included in the class of mortals in measuring how large a part of the class of mortals he may be. Obviously when the quantities involved cannot be precisely de-

<sup>15</sup> Here  $S_x = S_y$  and hence  $r' = r''$  and  $r = c/(c+s)$  (Eq. 12a)

<sup>16</sup> In this case where X includes Y, Equation 4 becomes:

$$r_{xy} = \sqrt{\frac{c}{c+s_x}} = \sqrt{r'_{xy}} \quad \text{and} \quad r''_{yx} = 1.0$$

$$\text{since} \quad \frac{c}{c+s_y} = \frac{c}{c+0} = 1 \quad (\text{Eq. 12b})$$

<sup>17</sup> Where  $p$  denotes the number of elements in the class P,  $S_N$  denotes the number of elements specific to class N, and  $S_p$  denotes the number of elements over and above the one person,  $\hat{p}$ , in class P, and where  $\hat{p}$  (Socrates) is a single member, or unit ( $\hat{p} = 1$ ):

$$r_{PN} = \sqrt{\frac{p}{p+s_m} \cdot \frac{p}{p}} = \sqrt{\frac{p}{p+s_m}} \quad , \quad r'_{PP} = \sqrt{\frac{\hat{p}}{p+s_p} \cdot \frac{\hat{p}}{\hat{p}}} = \sqrt{\frac{1}{1+s_p}}$$

$$r_{PN} = \sqrt{\frac{\hat{p}}{p+s_p+s_m} \cdot \frac{\hat{p}}{\hat{p}}} = \sqrt{\frac{1}{1+s_p+s_m}} \quad (\text{Eq. 13})$$

terminated, however, it is useful to have the logical concepts which assert the qualitative relation of part and whole, of included to including class.

In order to see the syllogism now as a regression equation, it is necessary to split the correlation Equation 12 into its two proportions each of which is a sort of one-way correlation. Let the first be denoted by  $r'$  and the other by  $r''$ .

Each of these newly christened "one-way" correlations measures the dependence of one variable upon the common elements and therefore upon the other variable. The sequence of the subscripts denotes for  $r'_{xy}$  the dependence of variable X on variable Y and for  $r''_{yx}$  the dependence of variable Y on variable X.  $\nabla$  In the case of inclusion  $r''$  is unity. This perfect correlation enables perfect prediction in its regression equation.  $\nabla$

Obviously when the correlation reaches its upper limit of perfection at unity the equation becomes an exact one with zero error of estimate. If  $r$  is one, the regression equation predicts perfectly one variable from the other without any approximateness or uncertainty.

Now, applying these principles to the syllogism, it is evident that since the second ratios are unities, then,  $r'' = 1.0$ , in both major and minor premises as shown in Equation 13, and the

$\nabla$  The formulae for the two one-way correlation proportions are:

$$r'_{xy} = \sqrt{\frac{c}{c + s_x}} \quad r''_{yx} = \sqrt{\frac{c}{c + s_y}} \quad (\text{Eq. 14})$$

These two one-way correlations, in common elements form, parallel the two correlation ratios,  $\text{eta}$ , , for curvilinear correlation. The  $\text{etas}$  are equal in rectilinear regression and become equal to  $r$ , paralleling (Eq. 12a) here.

$\nabla$  The regression equation in general is  $\bar{X}_1 = r_{12} \bar{X}_2$  (Eq. 15) where  $\bar{X}_1$  and  $\bar{X}_2$  denote (by their pre-subscripts from Eq. 4) that the variables are expressed in standard deviation units, and where the bar over  $X_1$  shows it to be the estimated value of  $X_1$  when estimated from the known  $X_2$  and their known correlation.

corresponding regression equations are exact equations. <sup>29</sup> Hence it is predicted with complete certainty that Socrates is mortal. In equivalent statistical language when the correlation of "mortality" on "manhood" is perfect, and Socrates is a particular value of the variate, "manhood," the regression equation asserts with exact precision that he is "mortal."

All this seems to the person untrained in statistics as more complicated than the verbal syllogism. It is. But the enormous advantage of it is that whereas the syllogism can assert definite conclusion only for cases of "all" or of "none," the regression equation asserts conclusions for these limiting cases and all intermediate cases. Most data in the social sciences fall in this intermediate class. The syllogism predicts perfectly only where the major premise is a universal affirmative or a universal negative, i.e. contain the equivalent of "all" or "none" in their phrasing and is inadequate for all the intermediate cases of particular affirmatives or negatives containing the equivalent of "some" in the major premise. The regression equation estimates these intermediate cases with a specified probability.

Thus the syllogism determines nothing about those mortals who are not men,  $S_M$ , the specific members of the class mortal. But if the classes can be quantified so that the number of elements or members in each were known, their ratio is  $r'$  in Equation 13 and states the probability of any "mortal" being a "mar."

But more generally than the above case of inclusion is the case of mutual overlap without complete inclusion, diagrammed in connection with Equation 12 above. This diagram is the general case of the logical product which is quantified by Equation 12. Here an illustrative syllogism might be "Some Americans hate Hitler." The common elements measuring the logical product are here "American Hitler-haters," but room is left for "Americans who don't hate Hitler" and so are specific to the class "Americans" and

<sup>29</sup> These regression equations are:

$$P = r''_{MP} \quad P = \frac{p}{p} \quad P = P \quad \quad \quad 'p = r''_{p'p'} \quad 'p = \frac{p}{p} \quad 'p = 'p$$

$$'p = r''_{MP} \quad 'p = \frac{p}{p} \quad 'p = 'p \quad \quad \quad (\text{Eq. 16 a, b, c})$$

for "Non-American Hitler-haters" who are here specific to the class "Hitler-haters."

The syllogism breaks down here and cannot conclude anything about S who is an American being a Hitler-hater or not, nor about Y who hates Hitler being an American or not. But whenever the classes have been quantified as by counting their members, correlation formulae (Eq. 12) measure the relation of Hitler-hating to Americans, and the constituent correlation ratios in Equation 14 state the probability of any American being a Hitler-hater and of any Hitler-hater being an American. Thus the correlational sub-form of the equivalence index increases the precision and range of syllogistic deduction.

But the syllogism has shrunk to very minor importance with the tremendous development in the last few decades of the science of deduction as modern symbolic logic has defined itself.<sup>21</sup> In modern logic, starting with a couple of primitive, or undefined terms, such as "class" and "neither-nor," a set of constants are defined and with their aid a vast wealth of propositions, theorems, and laws are deduced. The set of most important logical constants are commonly phrased as "not," "or," "and," "if, then," "if and only if." These five when applied to classes are called the negative, the logical sum, the logical product, inclusion and equivalence with the symbols  $\neg$ ,  $\cup$ ,  $\cap$ ,  $\subset$ ,  $=$  respectively. When applied to statements the equivalent constants are referred to as the negative or denial, disjunction, conjunction, implication, and mutual implication with the symbols  $\neg$ ,  $\vee$ ,  $\wedge$ ,  $\rightarrow$ ,  $\leftrightarrow$ , respectively, (though these symbols are not standardized as yet for all authors). The somewhat equivalent mathematical connectives applied to quantities are the negative, sum, product, inequality, and equality symbols, namely  $-$ ,  $+$ ,  $\times$ ,  $\geq$ ,  $=$ . An example of each applied to classes follows to give the sociometric reader a glimpse of this field and to clarify its relation to our equivalence index.

<sup>21</sup> Tarski, Alfred, "An Introduction to Logic," Oxford Univ. Press, 1941, p. 18.

It is interesting to note that modern symbolic logicians in devoting themselves wholly to deduction hardly mention induction, leaving that field to statisticians and others to develop.



USUAL PHRASE	NAME IN LOGIC	SYMBOLS	EXAMPLE
not	negative	$\sim A$	Not attracted
or	sum	$A \cup B$	Either attracted (A) or indifferent (B)
and	product	$A \cap B$	Both attracted (A) and attracting (B)
if, then	inclusion	$B \subset A$	"Mild attraction" (B) is included under "attraction" (A) or "if mildly attracted, then attracted"
if, and only if	equivalence	$A = B$	Attracted if and only if liking, or "attraction" is equivalent to "liking"

Now these logical constants, which are the modern basis of all deduction, can be arranged in a series according to degree of overlap, i.e. according to the size of the common factor which would be measured by the correlation coefficient. In the table below their arrangement relates them to correlations from 0 to + 1.0.

DEGREE OF OVERLAP	ROW #	DIAGRAM	CORRELATION		LOGICAL CONSTANT
			$r' = \frac{c}{c + s_1}$	$r'' = \frac{c}{c + s_2}$	
Disjoint case $c = 0 \quad s_1 = x_1 \quad s_2 = x_2$	1		0	0	Logical sum $\cup$
Logical Product Proper Overlap Case $c > 0 \quad x > s > 0$	2		$> 0$ $< 1.00$	$> 0$ $> 1.00$	Logical product $\cap$
Proper Inclusion Case $c = x_2 \quad s_2 = 0$	3		$> 0$ $< 1.00$	1.00	Inclusion $\subset$
Mutual Inclusion Case $c = x_1 = x_2 \quad s_1 = s_2 = 0$	4		1.00	1.00	Equivalence $=$

In this series note how the diagrams beginning with row #1 where the circles are separate or disjoint move together to overlap in the second row to have one circle overlap or include the other wholly in the third row, and to mutually coincide in the fourth row. The common elements, and therefore the correlation, rises from zero in the second row to unity in the fifth row. (The logical negative applies to one class only and is not a connective between two classes. Applied to one class it reverses the series below as the correlation proportion,  $r'$ , in the first

row between  $x_1$  and not  $x_2$  would be 1.0 and become 0 in the fourth row.  $r''$  is less determinate. The reversal is not exact in all cases as the logical negative is not to be identified with the mathematical negative and negative correlation. The logical constants in the first column do not apply only to the diagram in their own rows but rather to that diagram and to the diagrams below it. Thus the logical sum applies to diagrams 1 through 4; the logical product applies to diagrams 2 through 4; inclusion to diagrams 3 and 4; equivalence only to diagram 4. The first two logical constants ( $\cup$  and  $\cap$ ) connect two or more classes and generate new classes. The last two logical constants ( $\subset$  and  $=$ ) connect two or more classes and generate statements which have the property of being either true or false.

Since the logical constants in this series have cumulative relation to the circle diagrams, the two correlation proportions define these circle diagrams less ambiguously. They quantify or measure exactly these diagrammed overlaps in meaning of either classes or statements, whereas the logical constants assert the increasing amounts of overlap only roughly in broad class-intervals. Whenever the membership of the classes can be counted, the correlation proportions are the more precise tools for manipulating them; where they cannot be counted the proportions drop to equal precision with the logical constants. The correlation proportions, however, do not measure the logical sum outside of the disjoint case of row #1.

The complements of each  $r'$  and  $r''$  proportion is the proportion that the number of specific elements is to the total number of elements in each of the two variables. These two specific proportions separately or together in their arithmetic mean measure the logical sum or rather the cases defined by the circle diagrams. Thus the arithmetic mean of these two specific proportions varies from a maximum of unity in row #1 down to zero in row #4. The transformation of logical constants to these correlation proportions and specific proportions would seem worth exploring as an hypothesis towards giving greater precision and system to the logical constants.

The correlation proportions have been shown above to be special cases of the equivalence index. The logical sum can be

derived as another special case.<sup>22/</sup> But such derivation from a highly generalized formula should not be overemphasized. The equivalence index is so general that almost any formula can be subsumed if one substitutes into it drastically enough. No implication is intended here that the equivalence index should replace the logical constants in deduction. The logical constants are basic in their simplicity of derivation and their generality of application. Their quantification is a refinement which, however desirable when possible for greater scientific precision, is not to be pushed to the point of minimizing their utility in unquantified situations. The possible value of the equivalence index may be to systematize in one general formula many diverse statistical and logical formulae which altogether specify the chief procedures for inducing and deducing. Such specification of procedures is the operational definition of "induction" and "deduction."

### III Causation

Can causation, one of the most hoary of human preoccupations, be operationally defined by the formulae of statistics or logic? Can the concept be purged of its lurking semi-mystical elements such as some necessary "nexus" tying a cause to its effect? Can the sociometric student be taught such definite procedures for discovering causation as to make the student's causal analyses as reliable and as prediction-improving as the analyses of mature experts? In reply to such a question the third methodological hypothesis advanced in this paper is that causation can be defined in terms of time sequence and correlation formulae.

Altho the concept of "interaction" or reciprocal influence has grown of recent years and reduced the importance of one-way influence, yet the concept of one-way causation is still useful wherever a time sequence can be observed. For the scientific purposes of predicting and controlling phenomena, causation, as

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<sup>22/</sup> To degenerate  $E_3$  to the logical sum repeat the derivation of Eq. 6a above with the added condition that  $X_2^0$  is the universal class ( $X_2^0 = V$ ) so that it vanishes as a factor, leaving the sum of  $N$  different classes.

$$\sum_1^N X_1^0 V = \sum_1^N X_1^0$$



here defined, seems more useful, whenever it can be reliably observed, than interaction. "Interaction" becomes a necessary additional concept in proportion as the sequence in time of the events studied tends to become simultaneity in time.

It is proposed that causation be viewed simply as a convenient label for the combination of time sequence and correlation under adequately specified conditions. More rigorously the causation of any event or condition (called the effect) is that set of antecedent events and conditions (called the causes) which, under further specified conditions, show a multiple correlation of unity between causes and effect. In more operational language, "Search for those antecedent variables which have a reliable partial-multiple correlation of unity with a subsequent variable which is then called their 'effect.'"<sup>23</sup> These terms in the definition especially the "partial-multiple correlation" need further exposition. For examples of causation reduced to correlation plus sequence, the discussion of Mill's methods of induction of causation in the first section of this paper may be reviewed.

But to fix thinking on an example more definitely, suppose

<sup>23</sup> An algebraic statement of this definition of causation as a "partial-multiple correlation" is contained in the following formula:

$$r_{xy} = \frac{\sum t_X \sum (n-m) u_Y}{\sigma_X \sigma_Y} / N = \text{a measure of causation} \quad (\text{Eq. 18})$$

where:  $t$  and  $u$  denote, respectively, antecedent and subsequent points in time, i.e. prior and later dates of the variables  $X$  and  $Y$ ;  $\sigma$  in the pre-subscripts denotes that the causal variables,  $X$ , and the effect,  $Y$ , are in sigma units and hence their mean product here becomes a correlation coefficient.

$\Sigma(n-m)$  in the post-subscript denotes a sum of antecedent variables,  $n$  in number, less  $m$  other variables which are partialled out or eliminated by any of the technics cited below in Rules 5 - 8. This measure of causation is that special case of the equivalence index,  $Q$ , in Equation 4, where provision is made for a time sequence of the variables and for the first variable being an algebraic sum (or other function) of subvariables. Both  $X$  and  $Y$  may implicitly have qualitative factors,  $I^0$  which specify the attendant conditions. Thus each variable is the logical product of a varying quantity of some kind and qualitative classes specifying the standardized conditions.

in Moreno's sociometric tests in a girls' school, the causes of cohesion in a group were wanted. Cohesion may be measured in degrees by the cohesion index described above. If the cause is measurable in degrees also, the method of concomitant variations applies in its modern form of calculating a correlation coefficient or ratio. If among the causes any particular cause is only observable as present or absent then biserial  $r$  may be indicated for it. If a cause is a series of qualitative categories or alternatives the contingency coefficient may be the appropriate subform of the equivalence index to be used.

To start searching out the causes of group cohesion one has hypotheses as to what seem antecedent correlated variables. These may come from insight or intuition which are but names for informal and often subconscious inductions from one's past experience including vicarious experience from reading, etc. To formally test these hypotheses, the hypothesized causal variables must be first of all reliably observed and instruments may have to be developed for this purpose. Then the correlation of each with the effect (group cohesion) is calculated and the intercorrelation of each variable with every other is calculated. From these the multiple correlation formula is calculated and its deficit from unity, measured by the multiple alienation coefficient,  $K_{1.23\dots n}$ , is noted. This deficit shows how far off is the scientist's goal of such complete understanding of the causation as to enable perfect prediction of the effect from the causes.

Towards perfecting the multiple correlation observed, two complementary procedures must be used. One is to try to include in the causal variables, the elements which were hitherto specific in the effect. Search for the specific elements in the effect. Assuming the general case<sup>24</sup> of diagram #2 above for the logical product above in which  $x_1$  represents the observed set of causal variables and  $x_2$  represents the observed effect at issue, cast around for observable variables which have some of the  $s_2$  elements in them. This means to convert  $s_2$  elements into the common elements,  $C$ . The test of whether a new antecedent variable measures some of these hitherto specific elements in the effect is whether its inclusion in the causal set of variables improves their multiple correlation with the effect. Some empirical rules for finding such antecedent variables are cited below.

<sup>24</sup> This assumption is entirely general as it includes the case of rows #3 and #4 and includes the disjoint case of row #1 whenever the correlation is zero.

The other procedure towards perfecting the multiple correlation is to eliminate the specific elements,  $S_1$ , in the antecedent set of variables as these dilute the correlation. These elements are irrelevant to the causation at issue. Some empirical rules for eliminating them are sketched below.

The specific elements in the effect,  $S_2$ , will be referred to as the unknown elements in the effect; the specific elements,  $S_1$ , in the causal set of variables will be referred to as the obscuring elements.

In order, first, to convert the unknown elements in group cohesion, for example, into known elements common to at least some of the antecedent set, <sup>25</sup> the following rules of thumb would aid a research director:

1. Try out many antecedent variables. For preliminary exploration a 'shot gun' technic spattering at the whole causal landscape around the effect might hit upon significant causes.

2. Try out all known antecedent variables. Build on what social psychologists have discovered relative to group cohesion. Get experts in that field to advise and suggest variables to try out.

3. Develop new antecedent variables. Cultivate insight deliberately by intensive case studies, by participating in the life of the group, by steeping oneself in the literature, etc. Get brilliant and inventive persons to do this, train them in test construction and set them to developing new ways of observing, recording, and measuring new antecedent variables which they "hunch" may be correlated with group cohesion.

4. Concentrate on antecedent variables showing the highest correlations with the effect and the lowest intercorrelations. These variables have most of the c elements wanted and tend to have different c elements from each other thereby wastefully duplicating each other least.

In order, next, to eliminate the obscuring elements specific

<sup>25</sup> Whenever predicting a single dependent variable, the effect is the problem, the intricacies of specific, group and general factors or components among the antecedent variables can be simply reduced to a) elements common to the antecedent set taken as one variable and to the effect, and to b) elements specific to the antecedents because not in the effect. This is the simple case of two variables--the total measured causation and the effect at issue.

to the antecedent set of variables, the following rules are useful:

5. Specify the attendant conditions. By attendant conditions are meant any and all events or conditions which may be correlated to the effect but which were held constant at one value in the data as observed. Thus group cohesion was influenced, Moreno reports, by the presence of negro girls in the institution. White girls often chose negresses and tended to assign them a masculine role. Thus the absence of male companionship in the girls' institution was an attendant condition of his study. The all-or-none variable "male companions" or "no male companions" was correlated to group cohesion as measured, but instead of measuring this all-or-none antecedent variable, one value of it was chosen (by the nature of the available data in a girls' institution) and held constant. The resulting causes of cohesion that are found hold only for that situation. New intercorrelations and a new multiple correlation would have to be calculated were this "male companionship" variable allowed to vary.

It is good scientific technic to isolate one factor at a time as far as possible and observe its correlates before combining factors in their usual complexity in society. Hence highly restricted conditions requiring much specifying may be desirable at first and then these constant conditions may be allowed to vary either by manipulation or by statistical selection of data and the fuller causation of the event may be then progressively worked out. Causes are thus always relative to the attendant conditions which therefore must be specified and kept in mind in all interpreting.

6. Eliminate obscuring elements (which were defined as elements specific to the antecedents) by experimental control. For example, suppose that one hypothesized cause of group cohesion was "ego-enhancing experience in the group." Thus a girl who had been applauded by the group for something she had done would tend to feel a glow of pleasure which might by conditioning tend to make her like to choose as roommates and workmates the members of that applauding group. Perhaps the housemother's ratings might be the indicator or source of information for the "ego-enhancing experiences of members of the group." But each housemother, untrained in this reporting, would unknowingly inject specific elements of her own into her interpretation of "ego-enhancing experience." To reduce these obscuring specific elements,  $s_1$ , in diagram #2 above, the housemothers could be trained

by a course, by group discussion of sample cases, etc. until their specific elements were reduced by this training experiment. This reduction would be proved by increased correlation between the second set of housemothers' ratings of a sample of identical cases on "ego-enhancing experience."

7. Eliminate obscuring elements ( $s_1$ ) by statistical technics. If experimental manipulation of obscuring elements is not possible, it is often possible to eliminate them or control them, or measure their influence by such statistical technics as partial correlation, part correlation, path coefficients, and variance analysis. These technics are all based on calculating statistical moments and determinants of correlation coefficients—in short on compounding various forms of the equivalence index.

8. Eliminate obscuring variables by using "clearing" variables. A clearing variable, as christened by Mendershausen,<sup>29</sup> is one that cancels out elements specific to one variable in order to increase its correlation with another variable. Thus, for example, the investigator of group cohesion might want to see if the "social participation" score in a Chapin scale of socio-economic status measuring the girls' background before coming to the reformatory were a pre-correlate of group cohesion. ("Pre-correlate" is a convenient term for "antecedent correlated variable." A "pre-correlate" and "specification of conditions" is "a cause" as here defined.) But the other three parts of the Chapin scale might plausibly be expected to be obscuring, or irrelevant, elements for the purpose of finding causes of group cohesion. Hence they are a clearing variable because on subtracting their score from the already available and recorded total score of the Chapin scale the "social participation" section of that scale is isolated for correlating with the group cohesion index. The test of a variable being a clearing variable is that it has zero correlation with the effect, non-zero correlation with some antecedent variable, and on including with the antecedents improves their multiple correlation with the effect. Clearing variables may not be easy to find. The example above was a somewhat artificial case, cited because of its definiteness in cancelling out unwanted specific elements.

The four preceding rules, #5 - #8, are variant ways of partialling out the unwanted obscuring elements from a correlation.

<sup>29</sup> Mendershausen, Horst, "Clearing Variables in Confluence Analysis," *Jour. Amer. Stat. Ass'n*, Vol. 34, March 1939, pp. 93-105



Rule #5 partials out these obscuring elements by holding them constant and studying the causation under these specified conditions. Rule #6 manipulates the obscuring elements so as to observe the other antecedent variables at one or more constant values of the obscuring elements and thus partials out the influence of the latter. Rule #7 attempts to partial out obscuring elements by statistical technics. Rule #8 combines the last two in experimentally adding a clearing variable in order to partial out obscuring elements statistically. Since partialling out the obscuring elements is essential to perfect correlation between causes and effect, the definition of complete causation was phrased that the "partial-multiple correlation" must be unity. This means the multiple correlation between the team of antecedent variables and the one effect at issue when obscuring elements have been partialled out whether by statistical or other technics.

9. Improve the reliability of both the antecedent variables and the effect as observed. Unreliability means errors in observing due to the observer, to the observee, to the observand (the instrument), or to other attendant conditions. Often these sources of error can be separated experimentally, each measured and reduced.<sup>27</sup> These errors are specific elements. Unreliability always reduces a correlation, it never improves it. Therefore the observed multiple correlation will always be improved by reducing the specific errors in the variables. This means any and all of the technics for increasing reliability such as lengthening the test or sample of behavior, objectifying subjective items, better defining of terms, standardizing conditions of administration of the test or of observing the variable, etc.

Next best to actually improving the reliability is to measure its current amount by repeated observation of both the antecedent set of variables and the effect and then correcting the multiple correlation for attenuation. This formula for correcting for attenuation tells what the multiple correlation would be if the variables were perfectly reliable and is therefore a better measure of the true causation than the uncorrected multiple correlation.

A few other rules operate both to reduce obscuring specific elements and to transfer unknown specific elements in the effect

<sup>27</sup> A case in the author's experience of such analytic elimination of error is reported in his monograph, "A Controlled Experiment on Rural Hygiene in Syria," American University of Beirut, 1934, pp. 62-72.

to the class of known elements common to the antecedent variables. Some of these rules are:

10) Study wide ranges at first. The wider the range the greater the correlation. Since correlation indices are expressed in standard deviation units and the standard deviation measures and varies with the range of the variable, a correlation can be shrunk or stretched by observing it in a narrow or a wide range. For first exploration of causes, then, the wider range is more likely to reveal causes which can later be refined and studied in narrower ranges. Thus Moreno found that cohesion as between boys and girls in school classes varied with age, dropping during the 5-10 year age period and rising markedly with adolescence in the teens. Studying a wide range of inter-sex cohesion would be likely to reveal correlated factors more clearly than studying cohesion within one year of age.

11. Try antecedent variables which are nearest to the effect in space and in time. Group cohesion will be more highly correlated to recent behavior than to behavior years earlier. Recent behavior in the institution will predict cohesion in the institution groups better than behavior before coming to the institution in other widely scattered situations. Accuracy of prediction correlates positively with its immediacy and negatively with its remoteness. Time trends projected into the future are better guides for the near future than for the distant future. Causation itself is intimately correlated with proximity in space and time. The correlation coefficients between causes and effects will tend to rise as their temporal and spatial intervals decrease.

12. Distinguish degrees of antecedence. In the interplay of phenomena, antecedent correlates wax and wane with differential accelerations and durations. The pattern of causes of an effect that are observable a month before that effect may not be the same pattern that is observable a year before it or ten years earlier.

It is probably clearer analysis to determine a multiple regression equation for each antecedent period separately, whatever the length that is judged to be suitable or practicable for these periods. By comparing such multiple regression coefficients, each in time series, their temporal pattern of waxing and waning may be unravelled and the complete causation of a given effect may become more fully understood.

13. Repeat the study of causation under more widely varying conditions. This will change the pattern of common and specific elements. It will help to reveal what elements are specific or

common only under certain conditions and what ones are so more generally. This repetition also tends to show up spurious or chance correlations.

These rules may be readily amplified from the experience of many readers of Sociometry. They are not conceived as a full exposition of causation. They are intended simply to illustrate the possibility of defining causation operationally by specifying reliable procedures for measuring the known and the amount of the residual unknown causation of a given effect. Many pitfalls and controversial issues in causation have not been touched upon. The difficult problem of differentiating causes and effect from earlier and later effects of a third set of still more antecedent correlated variables has not been analyzed here. No test for distinguishing chance correlations, especially in short time series, from true causal correlations has been elaborated here, altho Rule 13 bears on this issue and on the issue in the preceding sentence. No adequate exposition has been made of the way in which "Gestalts" act as if they contributed a certain proportion of elements to the total causation so that analysis as here to mathematical elements is entirely compatible with observation of "wholes," "patterns," or other unquantified blocks of causation. The aim of this discussion is simply to present some evidence that semi-mystical description of causation in terms of "intrinsic," "necessary," "invariable," "nexuses," is unreliable and unnecessary since causation can be adequately defined in terms of time sequence and correlations. The only "nexus" or "mechanism" connecting antecedents A and effect B that is to be sought in science is any observable event or condition which is intermediate in time between A and B and which correlates nearer unity with each than they do with each other.



## STUDENT ATTITUDES TOWARD PARTICIPATION IN THE WAR<sup>V</sup>

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and

A. R. Gilliland

Northwestern University

In the period between the beginning of the present war and our entrance into it, a number of polls, notably those of Gallup and Roper, have made periodic surveys of the attitudinal position of the "American Public" with respect to the extent of our participation in what was until Pearl Harbor, Europe's War. The work of these investigators is praiseworthy, wide in scope, and so well conducted that, save for one factor, they would render this study superfluous.

Surveys of the type mentioned above have generally been conducted along dichotomous lines; that is, a pertinent question such as, "Do you favor the extension of aid to the Allies?" was asked of a carefully stratified sample of considerable size. Responses were restricted by the very nature of the polls to "yes" and "no." Results, consequently, had to be expressed as comparisons of the number of percentages of the sample favoring the various propositions and the number or percentages opposed to them.

It is obvious that attitudes toward such controversial issues are not of an "all-or-none" nature. Rather, they are distributed along a continuum ranging from a position of complete acceptance of the proposition through indifference to one of complete rejection. As interesting to the social scientist as the mere proportion of a sample or population favoring a given stand is the shape assumed by the distribution of such attitudes. To make such a determination, the authors in May, 1940 constructed a scale for the measurement of "Attitudes toward American partici-

<sup>V</sup> These data were originally presented at the 1942 meetings of the Midwestern Psychological Association.

pation in the present European conflict." This scale is of the Thurstone type. It has been administered at irregular intervals since its construction to a number of college students at several colleges and universities. Progress reports were published in the fall of 1940 (1) and 1941 (2). These reports cover the administration of the scale to sixteen groups at Northwestern University and to classes at other institutions. Comparisons of the shapes of the distribution and of the trends of the central and extreme tendencies were reported.

The present study limits itself to the work completed after the 1941 report and to some further analysis of previously reported data from Northwestern University and Brooklyn College.

Two hundred and three psychology students from Northwestern were tested on February tenth, 1941. Data with respect to the (a) sex, (b) fraternal affiliation, (c) mental age, and (d) religious preference, were obtained for these students.  $\checkmark$  In order to determine whether the differences between these groups were significant or due to chance, a Chi Square check was made. A significance beyond the one per cent level was found only in religious beliefs. The Jewish students were significantly more in favor of participation in the war than the non-Jewish students in February, 1941. Figure 1 compares the relative frequencies of Jewish and non-Jewish students on that date. Table I presents the data from Northwestern and Brooklyn on three different dates. These data are also presented in graphic form in Figures II and III. From Figure III it can be seen that, although Brooklyn is predominantly Jewish, the attitudes of the students are very similar to those of the non-Jewish students at Northwestern. Consequently, we must conclude that some factor other than religious preference is responsible for the difference noted at Northwestern.

Figure II presents data from Northwestern in terms of proportional frequencies in April, July, and December, 1941. These dates represent in turn: (1) a high point of isolationistic sentiment, (2) a period just following the onset of hostilities between Russia and Germany, and (3) one day after Pearl Harbor but prior to Germany's declaration of war on the United States. The three distributions in Figure III are from Brooklyn College taken at comparable periods.  $\checkmark$

$\checkmark$  The authors are indebted to Dr. E. L. Clark, Director of Admissions for these data.

$\checkmark$  The authors are indebted to Dr. A. H. Maslow for securing these data.

**FIGURE I**  
**RELATIVE STRENGTH OF PRO-WAR**  
**ATTITUDES AMONG JEWISH AND GENTILE**  
**STUDENTS AT NORTHWESTERN UNIVERSITY**  
**FEBRUARY 1941**

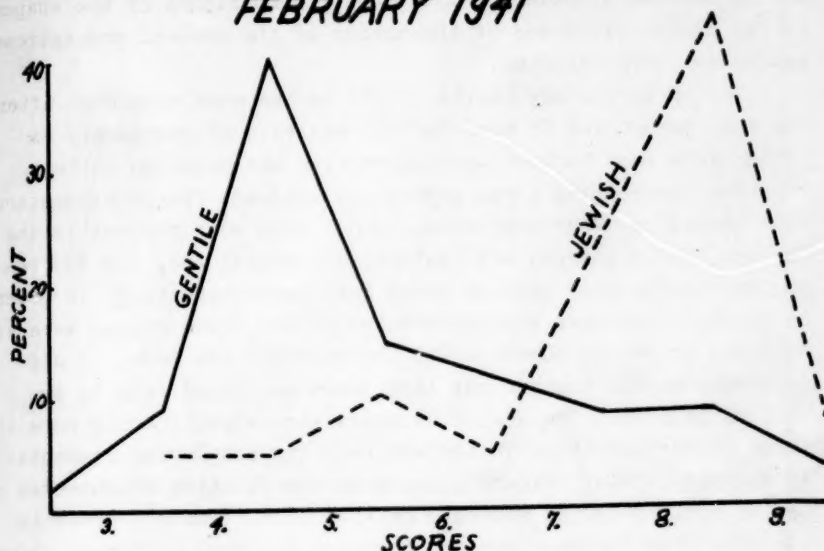
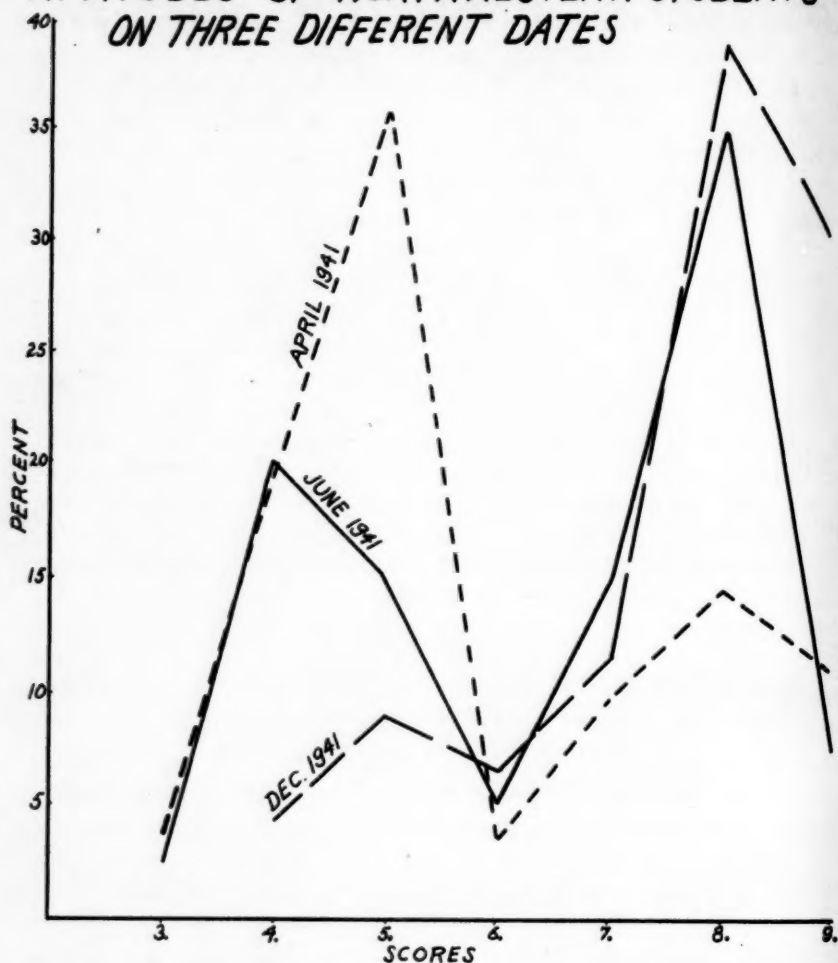


Table I

Showing Proportional Frequencies of Distributions on Attitude  
 toward War Scale at Northwestern University and Brooklyn  
 College on three different dates

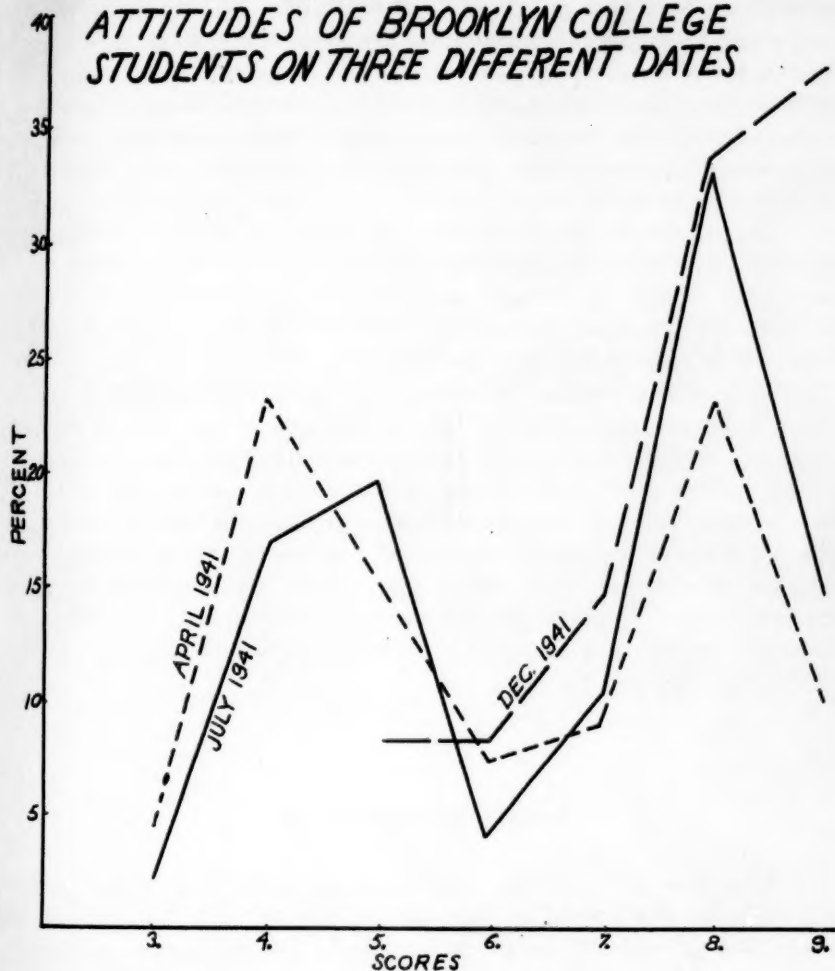
Score	Northwestern University			Brooklyn College		
	April	July	December	April	July	December
9.26	.92	2.00	13.25	5.35	7.15	6.10
8.76	5.96	5.00	16.35	4.67	7.15	30.60
8.26	11.91	20.00	25.09	18.20	20.04	16.70
7.76	13.78	15.00	13.25	4.82	12.75	16.70
7.26	3.21	12.50	4.22	4.82	6.62	12.50
6.76	9.18	2.50	7.25	2.14	3.57	2.00
6.26	3.67	5.00	1.21	5.25	2.57	4.10
5.76	5.04	.00	5.43	2.14	1.53	4.10
5.26	9.18	10.00	3.62	15.00	8.67	4.10
4.76	15.60	5.00	5.43	9.61	10.70	4.10
4.26	6.88	12.50	2.49	13.07	10.70	
3.76	9.18	7.50	1.81	10.70	6.12	
3.26	3.67	.00		2.14	.51	
2.76	1.35	2.50		2.14	1.53	
Number	218	40	166	187	196	49

**FIGURE II**  
**RELATIVE STRENGTH OF PRO-WAR**  
**ATTITUDES OF NORTHWESTERN STUDENTS**  
**ON THREE DIFFERENT DATES**



Despite its reputation of being a "liberal" institution, the attitudes of students of Brooklyn are quite similar to those of Northwestern. Although a considerable shift in the direction of participation is evident at Brooklyn following the beginning of the Russo-German war, this shift was no greater than that which occurred at Northwestern. When we consider the fact that North-

FIGURE III  
RELATIVE STRENGTH OF PRO-WAR  
ATTITUDES OF BROOKLYN COLLEGE  
STUDENTS ON THREE DIFFERENT DATES



western is located in the Middle West and is subject to such influences as the rabid isolationism of the Chicago Tribune and that Brooklyn is on the more war conscious East Coast, it is rather surprising to find the distributions of attitudes of the two institutions as similar as they are. We may also note in passing the close resemblance of the distribution of Jewish students at

Northwestern in February with that of the entire Northwestern sample taken immediately after Pearl Harbor.

The shapes assumed by the several distributions have been interesting from the beginning of the study. Most of the distributions have been multi-modal. In no case has a single distribution resembled a normal distribution. Early samples at Northwestern displayed a distinct bi-modality with the larger mode on the "isolationistic" side of the distribution. There has been a steady but irregular trend toward "interventionism" which culminated with the almost complete disappearance of the isolationistic mode after Pearl Harbor.

The nature of the statements of which the scale is composed renders its further use impracticable. While it might prove interesting to map the changes in attitudes of college students as war comes closer and closer to our shores, this scale is no longer appropriate for this purpose.

No claims are made for this study being representative of the attitudinal positions of the general population of the United States. It must be recalled that our samples were drawn from a rather narrow strata of the population as a whole and can only be representative of the larger population to the extent that the attitude of college students reflect the attitude of the country as a whole. That there may be some justification in this generalization from the data presented here lies in the extent to which results and changes in our data parallel those of the Gallup and Roper polls.

### Summary and Conclusions

Data from 203 attitude questionnaires were broken down for (a) sex, (b) fraternity versus non-fraternity, (c) high versus low intelligence, and (d) Jewish versus Christian religion. A significant difference was found only in the case of religion. Jewish students at Northwestern were significantly more in favor of participation in the European conflict than were the gentiles. A distribution of Brooklyn students more closely resembled the gentile distribution at Northwestern than it did the Jewish distribution. This seems to indicate that some influence other than religion was at work. Because of the Nazi treatment of the Jews this would have seemed to be the obvious explanation.



Distributions from Northwestern and Brooklyn were compared for three different dates, (a) a high point in isolationism, (b) immediately following the entry of Russia into the war, and (c) immediately after Pearl Harbor. From these results it appears that neither the distribution of attitudes nor their trend differed greatly between a conservative Midwestern university and a liberal Eastern college. This indicates that the influences affecting attitudes are very complex. That the similarity is not due to the inadequacy of the attitude scale is indicated by the fact that in a previous study (2) significant differences between college groups were found.

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# AN EXPLORATORY ANALYSIS OF OPINION TRENDS WITH SPECIAL REFERENCE TO CONSCRIPTION IN THE UNITED STATES<sup>V</sup>

by  
JACOB GOLDSTEIN

In the conventional methods of attitude study the basis for the selection of the subjects, the wording of the questions, the time at which the questions are asked, and the categories into which the responses are forced are all determined by the investigator before the actual collection of data. Such rigorous pre-determination is necessary in studies that aim at reliable cross-sections of public opinion on a given issue, as well as in attitude studies of a more strictly experimental nature. Yet the very fact that in these studies the data are forced into prearranged patterns implies that certain aspects of the phenomena under consideration will escape attention unless supplementary methods are also used. Thus, through a series of cross-sections of opinion the polls can secure information on the number of people who favor a given measure at a given time. They cannot, however, (except through a rather dubious introspective procedure) obtain information on the degree of public interest in an issue at a given time, or trace day-by-day fluctuations in the degree of interest as a function of events on the political scene. Yet data

<sup>V</sup>The study reported in this paper has originally formed Chapter III of the thesis entitled "Content Analysis: A Propaganda and Opinion Study," carried out under the sponsorship of Dr. Max Wertheimer and Dr. Hans Speier, and submitted to the Graduate Faculty of Political and Social Science, New School for Social Research, in partial fulfillment of the requirements for the degree of Doctor of Social Science in the Spring of 1942. The materials were made available to the writer by Dr. Paul F. Lazarsfeld, Director of the Columbia University Office of Radio Research, whose cooperation at all stages of the study is gratefully acknowledged.

on the latter, and on several related problems, might be of some value both from the standpoint of practical politics and of psychological theory.

In the light of these considerations it would seem likely that spontaneous mass communications of public opinion, such as letters written to members of Congress on major issues, might provide a suitable barometer for precisely those aspects of political attitudes that cannot be studied by the poll method. Unlike the poll respondent, the letter-writer reacts only after his own threshold of motivation has been reached, and is free to organize his responses into patterns relevant to his own frame of reference. Consequently, fluctuations in the frequency of letter-writing during a period of time (or in a group), if reliable, might with some qualifications be regarded as an index of interest, and changes in the relative frequency of the separate arguments used at various periods might be interpreted as indicating a change in the organization of the attitudes. The usefulness of such indices in actual research could only be determined through an examination of an actual set of data.

The study to be reported in this paper represents an exploratory attempt to test the usefulness of this barometer. The materials used consist of a selected sample of 701 letters pertaining to conscription received by two Middlewestern Senators during the summer of 1940. In view of the high level of public interest shown during the conscription debate this issue has seemed particularly suitable for the purposes of the present study. Choice of these two Senators was dictated by the fact that they had played the leading roles on the opposing sides of the conscription debate, and that both represented the same state.

The general plan of the study has been to trace some of the trends disclosed by the analysis of the letters, and to relate them, whenever possible, to specific political events. The analysis naturally falls into six major divisions as follows:

1. Long-range trends  $\nabla$  in gross frequencies of pro- and

$\nabla$  The distinction between the long- and short-range trends is based on the assumption that gradual changes might be the result of continuous propaganda campaigns or of continuous changes in the political situation, while short-range trends might reflect more spontaneous reactions to outstanding events. The distinction, however, is merely one of practical convenience, and its theoretical basis is admittedly weak.

anti-conscription mail.

2. Short-range trends<sup>✓</sup> in gross frequencies of pro- and anti-conscription mail.

3. Long-range trends in the characteristics of the writers (sex, socio-economic status, etc.).

4. Short-range trends in the characteristics of the writers. (More specifically, this involves a comparison of the letter-writing groups in the five-day periods immediately before and after August 11 - the beginning of the Battle of Britain).

In the presentation of this material it must be made explicit that the method used is not offered as a substitute for a public opinion poll. The very features of the method which make it attractive for some purposes also make it unsuitable as a means of opinion measurement in the ordinary sense of the term. Letter-writers constitute a self-selected sample, and as such cannot be regarded without further evidence as representative of the larger population. Previous mail studies (2) have generally shown a tendency toward systematic bias, and (assuming that the Gallup data can serve as the validity criterion) this bias has been particularly strong in the case of the conscription issue<sup>✓</sup>. Moreover, the content of the letters is, in a sense, just as self-selective as the writers. The subjects are free to express or not to express their views on any issue other than conscription, as well as arguments for or against the measure - a feature that adds considerably to the interest in qualitative analysis, but that inevitably restricts the scope of valid correlational treatment. Thus, since only a small fraction of the writers have expressed approval or disapproval of Roosevelt, it is impossible to state on the basis of the mail data whether pro- or anti-Roosevelt sentiment is significantly associated with the conscription attitude. Yet it would be of some interest to know, for instance, whether unfavorable mention of Roosevelt is more frequent among the "pro" than among the "anti" writers, since such

✓ Three Gallup polls held during the summer of 1940, two of them on a nationwide scale, have shown majorities of appr. 70% in favor of conscription, while appr. 80% of the senatorial mail was opposed to conscription. Although the Gallup data are not strictly comparable with the mail returns, the operation of bias due to differential motivation seems beyond question. These problems will be discussed in considerable detail in a forthcoming paper by Eisner (1).

data might give some indication of the relevance of the pro- and anti-Roosevelt attitudes to the conscription issue, as seen by various groups.

Probably the most serious limitation to the use of mail analysis as an index of spontaneous political behavior arises from the fact that pressure groups may be responsible to an unmeasurable extent for the frequency and content of letters at any given time. In an intensive study of conscription mail from two areas (3) it was found that approximately 25% to 33% of the letters could be traced to specific letter-writing campaigns. But the precise percentage of "inspired" letters seems to differ considerably from one area to another, apparently as a result of local conditions, and it is impossible to predict on the basis of previous studies how large a percentage of such letters can be expected in the present sample. While a small percentage of the letters in the present sample could be definitely diagnosed as "inspired," it did not seem justifiable to exclude these letters from the sample. The whole question of "inspired" mail is rather obscure, and it is impossible to tell without further evidence just how much spontaneity is involved in a given case. In any event, the number of cases in the present sample which could definitely be identified as "inspired" was negligible, and elimination of these would not have significantly diminished the operation of the pressure group factor<sup>✓</sup>. Furthermore, since the campaigns themselves presumably occur in response to political events, it might perhaps be argued that the effect of local campaigns is to a considerable extent randomized when a nation-wide sample is used. If that is the fact, statistical results based on mail analysis would be significant even though no meaningful inferences can be made about the motivation of the individual letter-writers.

That the operation of local pressure groups does not seriously distort the statistical analysis in the present report is indicated by the following:

1. The general pattern of the long-range trends in the characteristics of the writers is similar to the pattern of the short-range trends. It would be difficult to account for this similarity if the trends were affected to any considerable extent by special local factors.
2. The relationship between the sex trends in "pro" and

<sup>✓</sup>The difficulty of identifying "inspired" mail in this study was a function of the sampling procedure used.



"anti" groups shows a symmetrical balance that would be difficult to explain in terms of local campaigns. These campaigns might conceivably be directed only at one sex, as in the case of Mothers of America, but they are hardly likely to affect the two sexes in opposite directions.

3. The sex trends characteristic of the two test Senators' mail hold also in the case of another Senator from the Midwest even after the 32% of the mail traced to specific campaigns has been excluded.

### SELECTION OF THE SAMPLE

The method by which the sample was selected is described in detail in another paper of this series (4), and will be only summarized here. The pro- and anti-conscription mail of the two test Senators was divided into sixteen categories on the basis of four criteria: (1) the writers' stand on conscription ("pro" or "anti"); (2) the senator to whom the letter is addressed; (3) the writer's residence (the Senator's own state or other); (4) the writer's sex. The neutral letters (those which did not express an explicit stand for or against conscription) were not included.

The next step consisted in selecting a random sample of the letters within each of the sixteen categories. The letters within each category were assigned a series of consecutive numbers and chance tables were consulted in order to obtain a random sampling within each category (except when the total number was 50 or less). In those cases where the total number of letters within the block was 50 or less the entire sample was taken. Since this was true in several cases the final sample is only 701, or considerably less than the ideal 800 $\sqrt{2}$ .

The letters selected by this procedure do not represent the writers in each category in proportion to their numbers. The sixteen groups from which the separate random samples are drawn differ considerably in size. Moreover, the neutral letters are completely excluded from the present analysis, even though they form 6% of the total mail of the two Senators.

In a study aiming at a cross-section of opinion this method

$\sqrt{2}$  In those cases where more than one letter by the same person was found within the same block, the same number was assigned to both letters. If, as sometimes happened, letters by the same writer were found in two different blocks (addressed to a different Senator) they were coded independently.

of sampling would be seriously defective. However, in view of the fact that the purpose of the present study, and of several other studies in this series, is rather to obtain distributions of intra-group characteristics, as well as group comparisons of a semi-experimental nature, symmetrical balance of the subgroups is in this case more important than representativeness of the total sample. On the basis of data thus obtained, it is, of course, impossible to draw conclusions about sex, residence, Senator, and pro-con ratios. But data on these matters are already available from a previous study (3).

#### CODING OF THE LETTERS

After the sample had been selected, the letters were coded on the basis of (a) the Senator to whom the letter was sent, (b) the residence of the writer, (c) the date of the letter, (d) identification of the writer (age, sex, occupation, affiliations and other information that the writer might happen to have included), (e) an impressionistic rating on socio-economic status (high, middle, low), (f) arguments for or against conscription, (g) references to public opinion, (h) citation of pro- and anti-conscription authorities, (i) incidental expression of attitudes on related problems (aid to Britain, Roosevelt, etc.), (j) the use of stereotypes (war-monger, war-hysteria, etc.) as well as on stylistic features. The method of coding used, as well as data on the reliability of the code, has been previously described (4) and will not be discussed here except incidentally, in connection with the actual data. For the purposes of the present study it was found necessary, however, to add to the original code several items dealing more specifically with the immediate political situation, and these must be described in some detail.

In the construction of this supplementary code an attempt was made to secure a perfect balance between the pro and con arguments, as in the case of the main code, but this goal was sacrificed in two cases in view of other considerations. The arguments, as finally arranged, are as follows:

## PRO

1. U.S. (democracy, liberty, etc.) is worth fighting for ✓.
2. Effect of training on health, morale, etc. (beneficial).
3. Conscription would insure the U.S. against attack.
4. Conscription does not necessarily lead to fascism.

## ANTI

1. War is an evil. ✓
2. Effect of training on health, morale, etc. (detrimental).
3. Conscription is a step toward war.
4. The United States will become fascist in the process of fighting fascism. (Note. This category includes only letters in which the relationship between foreign and domestic fascism is made explicit. A statement to the effect that the United States is becoming a fascist country as a result of conscription would not be coded here unless it were also pointed out that the measure is designed to protect the United States against the very same evil from abroad. This means, of course, that in this case the balance between the pro and con arguments is definitely broken.)
5. Training and equipment. Here stress is placed on the fact that a modern army requires equipment as well as men, and that, as long as equipment is inadequate, a

5. Training and equipment. This includes all cases in which stress is placed on the fact that military training takes time, and that it

✓ *Strictly speaking, the two arguments in Item 1 are not balanced in the logical sense, since one might conceivably hold that the U.S. (democracy, liberty, etc.) is not worth fighting for without necessarily maintaining that war is an evil, and vice versa. Since practically none of the letter-writers in the sample have glorified war or explicitly declared that the U.S. is not worth defending, there is some empirical justification for regarding the two arguments as empirically balanced.*

PRO

is dangerous to go to war with an inadequately trained army. This argument must be distinguished sharply from No. 2 above, where the advantages of training are stressed for their own sake, independently of the war situation. In the present case advantages of training are viewed more specifically in terms of an anticipation of war.

6. Voluntary enlistment. This includes such arguments as that voluntary enlistment is too slow, that an army of volunteers could include Nazis and Communists, and that it would include only the best (or only the worst) elements of the population.

ANTI

conscript army will not of itself solve the defense problem.

6. Voluntary enlistment. This includes arguments as to the effect that voluntary enlistment could be made more successful if the army pay was raised, if the period of enlistment was made shorter, if the enlistment opportunities would receive more publicity, or if a guarantee could be given of no service abroad. Arguments to the effect that enlistment is the "American" ("democratic") way, as well as statements to the effect that enlistments have proved successful on previous occasions, were also included here.

These items have all been arrived at empirically, partly on the basis of newspaper arguments and partly through exploratory work on the mail. While in themselves they are quite incomplete as expressions of attitude for or against conscription, when taken in conjunction with parts of the main code they offer a much more rounded picture. These items, it might be added, are in the nature of an inventory, and as such are neither exclusive or exhaustive. Their inclusion in the study is based on the fact that they have all been extensively used in the conscription debate.

## LONG-RANGE TRENDS IN THE GROSS FREQUENCY OF MAIL

For the purpose of analyzing long-range trends monthly breakdowns have been made for the sample. The results of these breakdowns are presented in Table I. As will be seen by inspection of Table I, 27, or 3%, of the letters were not dated. Since the number of undated letters in the pro and con samples was practi-

TABLE I

## MONTHLY BREAKDOWNS OF CONSCRIPTION MAIL

Month	Pro Senator Pro Writer	Pro Senator Con Writer	Con Senator Pro Writer	Con Senator Con Writer	Total
June	18	17	4	8	47
July	28	44	10	70	152
August	97	122	109	114	442
September	14	6	8	5	33
September (corrected)	28	12	16	10	66
Month not indicated	6	11	7	3	27
Total	163	200	138	200	701
Chances in 100 that the variation is significant	99	99	99	99	99

The correction for the September data was made necessary by the fact that the Selective Service Act was passed on September 14, and that, consequently, only letters written prior to that date could be considered in the study. In applying the correction it is assumed that a half of the month of September was available to the letter-writers. This assumption introduces a negligible error, but it facilitates considerably the computations involved. However, the totals in the seventh row from the top are all based on the obtained rather than on the corrected values.

The chance values in the bottom row have been computed by means of the Chi-square test on the assumption that the June value is also the expected value for the other three months. The choice of June as the criterion month is arbitrary, but there is reason to suppose that the choice of any other month (or of the average) would not have altered the result beyond the limit of 99 chances in 100.



cally equal (13 and 14 respectively) there is some justification for assuming that the exclusion of these letters from the time breakdowns did not introduce any important systematic bias.

All of the dated letters in the sample were sent at some time between the beginning of June and the middle of September 1940. This was to be expected, since the conscription debate did not really gain momentum until June, and it was arbitrarily ended through the passage of the Selective Service Act on September 14. Actually some of the conscription letters (notably those in the pro-conscription group) had been written as early as January, 1940, but the proportion of these was apparently negligible, and none of them survived the procedure of random intra-group selection.

As an examination of Table I will show, the monthly breakdowns for the four subgroups show a characteristic common pattern. In each case there is a consistent rise in frequency from June to August, followed by an equally consistent drop in September. The September drop remains even after the appropriate correction is made for the fact that the debate ended on the 14th.

The increase in mail frequency between June and August can be easily understood as a reflection of the steadily increasing seriousness of the European situation, as well as of a violent domestic controversy. But the September drop provides a more difficult problem - especially in view of the fact that intensive bombing of British civilians started in the beginning of September. One possible explanation of this drop might be that the Congressional debate on the conscription issue was exceptionally long, and that most of the potential letter-writers had already reached their "thresholds of reaction" long before the passage of the Selective Service Act. It might be noted in this connection that while the European situation had steadily continued to grow in seriousness throughout August and September, with daily bombing of Great Britain, it is rather doubtful whether any of the single military or political events occurring between August 11 (the beginning of the Battle of Britain) and September 14 could have been of such a nature as to reorient the war attitudes or raise the level of excitement on a nation-wide scale to any marked extent.

#### SHORT-RANGE TRENDS IN THE GROSS FREQUENCY OF MAIL

The general picture gained through the monthly breakdowns is amplified in several respects when the day-by-day breakdowns for

the pro- and anti-conscription groups are considered. These breakdowns are given in full in Table II.

TABLE II  
DAY-BY-DAY FLUCTUATIONS IN FREQUENCY OF CONSCRIPTION MAIL

Day	Pro				Anti			
	June	July	August	September	June	July	August	September
1	0	3	4	0	0	1	7	3
2	0	2	6	1	0	2	7	0
3	0	1	7	1	0	1	14	3
4	0	1	2	0	0	1	12	1
5	0	2	5	3	0	0	10	0
6	0	0	6	2	0	0	18	1
7	0	2	4	9	0	1	12	1
8	0	1	4	0	0	1	8	0
9	0	1	5	4	0	0	7	0
10	0	1	4	1	1	2	9	0
11	0	0	3	0	2	1	6	1
12	0	1	13	0	0	0	18	1
13	0	2	14	1	0	1	27	0
14	0	0	16	0	0	3	12	0
15	2	2	17	0	0	0	10	0
16	0	2	11	0	0	1	6	0
17	1	0	1	0	0	2	2	0
18	1	1	4	0	0	0	4	0
19	1	2	14	0	0	1	5	0
20	0	0	6	0	0	1	2	0
21	7	0	10	0	4	2	7	0
22	4	2	11	0	6	4	2	0
23	3	1	11	0	0	0	3	0
24	1	0	9	0	2	5	4	0
25	0	0	3	0	2	11	7	0
26	1	1	3	0	0	10	9	0
27	0	2	5	0	3	8	4	0
28	0	1	4	0	1	13	1	0
29	0	1	0	0	1	13	0	0
30	2	3	1	0	0	20	1	0
31	0	3	2	0	0	9	1	0
	22	38	205	22	22	114	236	11

This table includes day-by-day breakdowns in frequency for all the pro and con letters in the sample for which both the month and the day of the month are indicated.

An apparent discrepancy between the totals in Tables II and III is due to the fact that a few of the writers have indicated the month in which the letter was written but not the day.

Both the pro- and anti-conscription letters appear to receive their first impetus in the period immediately following the fall of France. While only four of the pro- and three of the anti-conscription letters are dated as prior to or on June 18, the figure for the next five days (June 19 to June 23 inclusive) rises to 15

in the pro- and to 10 in the anti-conscription group. Following this five-day period there is a drop in both groups, and, except for fluctuations of an apparently random character, the frequencies remain approximately constant until the 20th of July. At this point the anti-conscription mail becomes considerably accelerated, reaching a total of 63 in the period between July 27 and July 31, maintains practically the same level, except for random (?) fluctuations, until about the seventh of August, and then shows a slight drop. A corresponding wave is also indicated in the pro-conscription data for the same period, but here the acceleration seems to lag several days behind the anti group (though this lag cannot be reliably established in view of the small number of cases involved), and the frequency at the peak of the wave is less than one-half as large as in the anti group. The explanation of this wave, as well as of the group difference, does not seem entirely clear. Quite possibly increased activity on the part of peace groups may have been responsible for this result.

The most pronounced increase in the frequency of both the pro- and the anti-conscription mail occurs after August 11 (the beginning of the Battle of Britain). While in the period between August 7 and August 11 inclusive there have been 20 letters in the pro- and 42 letters in the anti-conscription group, the number of letters in the immediately following five-day period (August 12 to August 16 inclusive) shows a rise to 71 in the pro and 73 in the anti group. In the five-day period that follows, the frequency again drops to 36 in the pro and 20 in the con group, and remains practically at the same level for still another five-day period (August 22 to 26 inclusive). Following this there is a gradual and consistent drop in both groups, except for one minor wave in the pro group.

Although the day-by-day breakdowns are not particularly suitable for correlational treatment, the tendencies that have already been described would seem to suggest that the pro- and the anti-conscription writers have been stimulated to a considerable extent by the same events. This is brought out most clearly in the data on the Battle of Britain, where a simultaneous rise occurs in both groups. In other cases this correspondence between groups is a little more obscure, as when a wave in one group lags behind a wave in the other, yet even there both patterns seem surprisingly similar.

## LONG-RANGE TRENDS IN THE CHARACTERISTICS OF THE WRITERS

An analysis of the monthly sex breakdowns of the pro and con groups as presented in Table III discloses a consistent and significant shift in the sex composition of the "pro" group between June and September, while no corresponding shift appears in the "anti" group. Whereas in the month of June 77% of the "pro" letters are from male writers, the monthly percentage of such letters from male writers drops consistently until the figure of 41% is reached in September. The probability that this particular distribution of percentage values could have been obtained by chance alone is less than one in a hundred. During the same period the monthly percentage of female writers in the "pro" group rises from 18% in June to 50% in September. This rise occurs by fairly even steps and without a single reversal, thus yielding a distribution that could have been obtained by chance in less than one in 100 cases. ✓

The corresponding trends for the "anti" group are more difficult to interpret. If the September figures are excluded from consideration, the resulting trends are the reverse of those for the "pro" group, with a consistent and reliable increase for the men and a consistent and reliable decrease for the women between June and August. In both cases, however, there is a sharp reversal of the trend in September, so that the net result of the June-September comparisons is in a direction opposite to the June-July-August trends, but in view of the small number of September cases these reversals are not fully reliable.

Since it was rather difficult to find an explanation of these trends by a simple consideration of political events, it was decided to follow up this matter by a more detailed consideration of some additional statistical breakdowns. The procedure used consisted in making separate time breakdowns for each sex (within the "pro" group) in the hope that some factors responsible for the variation in the sex distributions could be discovered by this crudely empirical procedure. Since the separate sex frequencies for June and September within the "pro" group would have been too small for significant statistical comparisons, it was found necessary to combine the data into two-month intervals for the purpose of this analysis, so that June is grouped together with July

✓ The percentage values for the sexes given in the text are based on the total number of letters rather than on the sum of the letters of male and female writers.





TABLE IV

SEX-SOCIO-ECONOMIC-TIME DISTRIBUTIONS IN THE  
PRO-CONSCRIPTION GROUP

Socio-economic rating	June - July Male "pro"		August-September male "pro"		June-July Feminine "pro"		August-September feminine "pro"	
High	29	66%	89	74%	8	53%	35	39%
Medium	14	32	38	29	4	27	46	52
Low	1	2	3	2	3	20	8	9
Other (mixed indications)	0	0	0	0	0	0	1	1
Total	44		130		15		90	

lowest group remains constant (2%). During the same interval the percentage of female "pro" writers in the highest socio-economic group falls from 53% to 39%, the percentage in the medium group rises from 27% to 52%, while the percentage in the lowest socio-economic group drops again from 20% to 9%. Whatever the full explanation of these changes may be, it would seem, therefore, that the major source of the increase in the proportion of female writers within the "pro" group is in the medium socio-economic group, and that the tendency within the two extreme socio-economic groups is actually in the opposite direction.

## SHORT-RANGE TRENDS IN THE CHARACTERISTICS OF THE WRITERS

In the preceding analysis it has been shown that, when monthly breakdowns of the data are made, the socio-economic and sex composition of the groups changes considerably. It is the purpose of the present section to present a parallel analysis for a much shorter time interval. Such an analysis has seemed worthwhile in view of the fact that (1) significant short-range variations may sometimes be obscured when a long interval is used, and (2) by using a shorter interval it might sometimes be easier to trace a relationship between specific events and the observed changes.

In view of practical considerations it was necessary to limit the short-range breakdowns to a relatively small number of crucial comparisons. While it was originally intended to carry out the comparisons at two or three periods, only one period has finally proved satisfactory for the purpose, - the period immediately preceding and following the beginning of the Battle of Britain

(August 11). Some of the other periods that were considered were subsequently rejected because the number of cases was too small to permit statistically reliable comparisons and the situations were not sufficiently clear-cut. (Thus, the letters that came immediately after the fall of France might have represented a delayed reaction to Italy's declaration of war or to Roosevelt's "stab in the back" speech, both of which had occurred only a few days earlier.) A significant rise in the size of both the "pro" and the "con" groups in the five-day period following August 11 had indicated further that this would be the most fruitful period for study. The comparison that was finally carried out consisted in a series of parallel breakdowns for the intervals of August 7-11 and August 12-16 in the "pro" and "con" groups.

As in the case of the long-range breakdowns, the comparisons reveal a striking change in the sex composition of the letter-writing groups. While in the five-day period immediately preceding August 11, 80% of the "pro" writers are males, the proportion falls to 49% during the succeeding five-day period. During the same period the proportion of women in the "pro" group rises from 20% to 45%.  $\checkmark$  This is entirely in line with the trend discovered in the monthly breakdowns, as far as the direction of the change is concerned, though the magnitude of the changes is greater than one might have expected by analyzing the long-time trends. This would suggest that the long-range changes might have represented the net result of reactions to specific events rather than a continuous process.

The anti-conscription group also shows reliable shifts in the frequencies of both sexes before and after August 11. But these shifts are both in the direction opposite to those in the "pro" group. While the proportion of males in the "anti" group rises from 40% to 55%, the proportion of females falls from 50% to 38%.

In view of the relationship between sex and socio-economic factors suggested by the long-range breakdowns, a comparison of the socio-economic composition of the groups before and after August 11 has also been made. This comparison disclosed an increase of 45% to 63% in the proportion of "high" writers in the "pro" group, with corresponding decreases in the other two socio-

$\checkmark$  As in the long-range comparisons, these sex percentages are based on the total number of letters rather than on the sum of male and female letters, and for that reason the totals do not necessarily add up to 100%.

economic categories. In the "anti" group this relationship was reversed. The proportion of "anti" writers in the "high" groups fell from 36% to 22%, while the proportions in the other two categories increased. Although the causes of these shifts cannot be satisfactorily explained on the basis of the available data (at least, not without a number of additional breakdowns), when both the "pro" and "con" figures are considered it is difficult to escape the conclusion that the sex and socio-economic composition of the letter-writers can be considerably modified by major political events.

In view of the self-selected nature of the sample this fluctuation in the sex and socio-economic composition of the letter-writing group could be open to two possible interpretations. Either the fluctuation represented a real change in the attitudes of a substantial portion of the population on the conscription issue or some other factor was at work to alter the relative degree of letter-writing motivation of the sex and socio-economic groups. In view of the magnitude of the changes the first alternative seems rather unlikely. Yet the possibility of a real change cannot be completely dismissed, particularly in view of the symmetrical balance between the sex shifts in the "pro" and "anti" groups, a balance that would not necessarily have resulted if a change in the level of motivation were the sole factor involved.

If the fluctuations are representative of real changes in attitudes corresponding changes should also be shown in the Gallup polls taken at corresponding periods. In the present instance two Gallup polls on conscription were available for comparison, one taken on August 6 and the other on August 20. In both polls the percentage of males in favor of conscription (72.1% and 78.4%) is greater than the percentage of females (67.3% and 75.7%), but in both sexes the percentage of those who support conscription rises between the first and second poll. The increase is somewhat greater in the female than in the male group, but the difference (2.1%) is not sufficient to account for the difference in the letter-writing group.

In the light of the Gallup figures the motivation hypothesis appears to be the more plausible, at least as far as the sex data are concerned. But in interpreting the Gallup figures one must bear in mind that the time at which the polls were taken does not correspond exactly to the time intervals for which the short-range breakdowns were made. In view of the fact that the fluctuations appear in general to be a rather short-range affair it is quite

possible that by the time the second Gallup poll was taken the sex proportion of the letter-writers had already returned to the level of August 7-11. It might also be mentioned in this connection that the attitude measured by the Gallup question on conscription was not strictly equivalent to the pro- and anti-conscription attitudes as defined in this study. The question referred to conscription of men between 21 and 31, and, considering the way it was worded, it is even conceivable that some advocates of a more extreme measure would have answered it in the negative. <sup>19</sup> The context in which the question was asked in the two polls was also not strictly equivalent, since in the second poll the conscription question was preceded by several others bearing on the conscription issue. That the preceding questions may have had some effect in altering the response is suggested by the fact that the percentage of "don't know" responses for both sexes shows an increase from the first to the second poll. Yet it does not seem likely that these two factors (the form and the position of the question) could have seriously distorted the sex trends. <sup>19</sup>

While the Gallup comparison does not provide a crucial test of the two hypotheses, it indicates a change in motivation as the more likely possibility. Three suggestions may be formulated to account for this change:

1. The change was merely the result of a local campaign, and as such is of no psychological interest.

This hypothesis seems extremely improbable for the following reasons:

- a. It does not account for the similarity in the general pattern of long- and short-range variations.
- b. It does not account for the symmetrical balance between the variations in the "pro" and in the "con" groups.
- c. The home state of the test Senators is the only state which is sufficiently well represented in the sample to show the effects of a local campaign. Yet the number of "pro" women from this state in the sample is too small to account for the fluctuation. It is possible, of course, that a local campaign in the Senators' home state coincided with a nation-wide

<sup>19</sup> The exact wording was: "Do you favor increasing the size of our army and navy by drafting men between the ages of 21 and 31 to serve in the armed forces for one year?"

<sup>19</sup> The data on the Gallup polls are cited from an unpublished paper by Eisner (1).

shift in attitudes (as revealed in the rather slight change in the sex balance in the Gallup poll), and that the observed changes in the composition of the letter-writing group are a joint effect of both factors.

2. The shifts in the sex ratios of the letter-writers represent a reaction to the earlier campaigns of Mothers of America and other similar groups.

The chief virtue of this hypothesis is that it accounts adequately for the symmetrical balance between the shifts in the pro and con groups without necessitating the assumption of a real change in attitudes. At the same time it seems rather improbable that the magnitude of the changes brought about through this factor alone could have been as great as found in this study.

3. Among the potential letter-writers there is a qualitative sex difference in interest taken in political activity (or, to make a more restricted statement, there is a qualitative difference in the interest taken by men and women on the present war issue). Whereas the men maintain their interest at a relatively constant level, women show a greater interest in times of crisis and much less at other times.

This hypothesis accounts adequately for the changes observed in the "pro" group. On the other hand, the changes in the "con" group are in the direction opposite to that predicted by the hypothesis. In order, therefore, to save this hypothesis one would have to postulate an additional factor, such as increasing anxiety of men of draft age, to account for the behavior of the "anti" group. Since the data on the ages of the letter-writers are very incomplete, this supplementary assumption cannot be verified on the basis of the available data. <sup>✓</sup> In the absence of more adequate data it may, therefore, be supposed that several factors (including a "real" change in attitudes) have operated jointly to produce the obtained results.

<sup>✓</sup> *The time breakdowns on identification of the writer in terms of age do not throw much light on this point, since the proportion of males who identify themselves as falling within the 21-35 age group is practically constant throughout. The proportion of those males who identify themselves as falling within the 35-80 age category drops from 30% in June-July to 5% in August-September, but this is not very enlightening in view of the fact that the majority of the writers do not identify themselves in terms of age.*



# CHANGES IN THE CONTENT OF THE LETTERS - LONG-RANGE TRENDS

In view of the changes in the sex and socio-economic composition of the letter-writing group, as shown by the monthly and the short-range breakdowns, any corresponding changes in the content of the letters would seem to be subject to two possible interpretations. One possibility is that the changes in content are merely a consequence of the changing composition of the group, and do not reflect a change in the organization of conscription attitudes within any one group or for the population as a whole. The other possibility is that any consistent changes in content reveal corresponding changes in the organization of conscription attitudes or, more concretely, that the organization of pro- or anti-conscription arguments presented by any particular writer would be altered as a function of external events.

A crucial differential test of these two hypotheses could not be undertaken on the basis of the available data. Such socio-economic breakdowns for arguments as were available did not reveal any patterns similar to those in the monthly breakdowns. Further breakdowns, with a detailed analysis of the interaction of sex, socio-economic, and geographical factors, might have yielded some information on this point, but in view of the amount of tabulation involved, as well as a relatively slight chance of obtaining a meaningful result, this procedure did not seem advisable. Even if such an analysis had been carried out the results could hardly have been conclusive, since no information is available on the extent to which the composition of the letter-writing group may have changed in respects other than sex, residence and socio-economic status.

If the assumption is tentatively made that changes in the organization of the attitudes are the chief factor responsible. for changes in content, one would expect the changes in content to follow a pattern that could be meaningfully related to changes in the political scene. The analysis of the data reveals some indications of such a pattern, but some of the trends show a wave-like character, and for that reason a clear-cut statistical interpretation of the results is not always possible.

The most general assumption that can be made concerning the pattern of the changes is that they represent an increasing realization of the seriousness of the war situation on the part of both the "pro" and the "con" groups. If this is the case one should expect increasing stress on the seriousness of the situation in the "pro" group, with no corresponding increase in the

"anti" group. At the same time the "anti" group might be expected to argue increasingly in terms of standards of a more general nature (Americanism, the Constitution, democracy, etc.) or in terms of the relative merits of the Selective Service Bill as compared with other methods of defense, with a diminishing frequency of denials of the seriousness of the European danger.

Some of the data (such as those on the arguments in terms of "Americanism") are very much in line with the hypothesis. In the case of some other arguments (e.g., "conscription does not necessarily lead to fascism") the trends show reliable reversals, and are for that reason difficult to interpret as evidence either for or against the hypothesis. Still other arguments ("divinity," "morality," etc.) show only negligible variation, and for that reason are unsuitable for testing the hypothesis. However, when these latter arguments are considered as a group their relative frequency is slightly higher for August than for any other month.

Although the present data do not permit a clear-cut conclusion concerning the causes of the wave-like trends, these trends are too reliable to be dismissed as due to accidental factors. It seems likely that many of these trends would become meaningful if seen against a background of a detailed content analysis of the newspaper and radio programs during this period. Such background materials would not only have facilitated the interpretation of the observed trends, but would probably also have provided a basis for a more rational periodization.<sup>12</sup>

In the absence of such materials a detailed discussion of the long-range distributions of arguments did not seem warranted. In view of the amount of space that would be required the tabulations of the monthly trends (or of the reliabilities of these trends) have not been included, although such data are available. The same holds for the data on miscellaneous comments and on some selected stereotyped phrases.<sup>13</sup>

<sup>12</sup> Field studies of the operation of pressure groups, street-corner meetings, etc., during the period under consideration might, if available, also throw some light on the problem.

<sup>13</sup> These data, as well as the corresponding data on short-range trends, are presented in full in Appendix III of the writer's thesis, "Content Analysis: a Propaganda and Opinion Study," on file at the Library of the New School for Social Research. It is hoped that the material will soon be put into mimeographed form, so that it can be made more easily available on request.

TABLE V  
REFERENCES TO PUBLIC OPINION AND CITATION OF AUTHORITY

	A. "Pro"							
	June		July		August		September	
	N	%	N	%	N	%	N	%
Citation of Authority	6	27	7	18	44	21	3	14
Any Reference to Public Opinion	7	32	5	13	41	20	1	5
	B. "Con"							
	June		July		August		September	
	N	%	N	%	N	%	N	%
Citation of Authority	1	4	8	7	28	12	1	9
Any Reference to Public Opinion	3	12	26	23	65	28	4	36

The monthly breakdowns on references to authority and public opinion in the "pro" and "con" groups are shown in Table V. These data give further support to a hypothesis stated in another paper of this series (4), namely, that citation of the opinions of others in support of one's own views is more likely to occur if one is on the losing side. European events that were taking place while the debate on the Burke-Wadsworth Bill was in progress were of such a nature as to strengthen progressively the chances of the bill's passage, and the increase in references to public opinion in the "anti" group from 12% in June to 36% in September might be interpreted as a reaction to this situation. Yet even in the case of references to public opinion the full significance of the data is somewhat obscured by reversals in some of the trends.

#### SHORT-RANGE TRENDS IN THE CONTENT OF THE LETTERS

A comparison of the short-range trends in content with the data reported in the previous sections yields the following observations:

1. Just as the short-range changes in the characteristics of the letter-writers are greater (in percentage terms) than the

corresponding long-range changes, fluctuations in content are greater for the short- than for the long-range trends. This supports the previously suggested hypothesis that long-range trends represent merely the net results of responses to significant events.

2. In those cases where a clear trend is discernible in the long-range breakdowns, a similar trend is generally displayed by the short-range breakdowns. This may be taken as an indication (a) that the method used is reliable, and (b) that the increasing seriousness of the European situation has at least some connection with changes in content.

As in the case of the long-range breakdowns, limitations of space do not permit inclusion of the complete tables on arguments, miscellaneous comments, and stereotypic phrases, though such tables are available to the especially interested reader;<sup>14</sup> and the present discussion is restricted to items that are of special interest.

In the "pro" group some fairly substantial differences are shown under the category of "standards." Thus, there is a decrease from 15% to 1% in the use of the standard of "Americanism", an increase from 10% to 24% in the use of the standards of "Democracy", and a drop of from 35% to 11% in the references to patriotism of opponents of the measure. Slight and probably insignificant increases occur also under the categories of "morality", "morality of supporters", "militarism", and "fascism", but they are too small to be of interest. As in the case of the long-range trends, the decrease in "Americanism" might possibly be explained on the assumption that the letters written during the second period constituted on the whole a reaction to a concrete danger situation, and that practical aspects of the defense program seemed at the moment more important than appeal to abstract symbols. The drop in the references to patriotism of opponents can perhaps be explained by a focussing of attention on the external danger. The increase in references to "democracy", on the other hand, might be explained on the assumption that the "pro" arguments in terms of "democracy" constituted a less homogeneous category than those in terms of "Americanism".

The corresponding breakdowns in the "anti" group reveal a slight increase (14% to 21%) in the use of the standard of "Americanism" and of "Democracy" (17% to 21%) and a slight decrease of

<sup>14</sup> See footnote 13.

arguments in terms of "Legality" (10% to 4%), morality (5% to 3%), and patriotism of opponents (5% to 0). In view of the low reliabilities these figures are difficult to interpret. The increase in the use of abstract symbols might indicate a defense reaction against the changes in the objective situation. But if this assumption is correct, the decrease of arguments in terms of legality is again rather difficult to explain.

If the increase in letter-writing following August 11 is to be explained as a reaction to danger, it will be difficult to account for the drop in arguments in terms of "expediency" from 55% to 46% in the "pro" group. The picture is further complicated when we consider that the "efficiency" category in the "anti" group increases from 14% to 22%, while the "expediency" category decreases by only 3% (26% to 23%). It is possible, perhaps, that in the light of the European events, arguments in terms of expediency (necessity for some sort of defense in view of the increasing European danger) have become more obvious to the "pro" group and for that reason have required less explicit mention, while the need for stressing efficiency (the adequacy of conscription as a defense measure) has remained practically constant (30% to 32%). The slight decrease in the expediency category in the "anti" group would then reflect a growing realization of European danger, with the criticisms being directed more specifically at the appropriateness of conscription as a defense measure rather than at the defense program as such. The low reliabilities of the changes must, however, again be taken into account in the interpretation of these figures.

Some other changes in the content of the letters may also be noted under the heading of "Expectations." In the "pro" group there is an increase in the proportion of arguments in terms of negative gain (safety) (10% to 21%) and a decrease of arguments in terms of positive loss (safety) (10% to 3%), as well as a very slight drop (25% to 21%) in arguments in terms of positive gain (safety). The increase in arguments in terms of negative gain can be interpreted rather easily as a reaction to increasing danger. The decrease in the positive loss category may be similarly interpreted. The drop in arguments in terms of positive gain might possibly indicate that when the measure can be adequately justified in terms of necessity one is less likely to use the argument that military training is in itself beneficial. The shift might be indicative, however, of a change in the composition of the group rather than of a real reorganization of atti-



tudes. This is on the assumption that people who believe in the intrinsic merits of military training have a lower threshold of response in a pro-conscription campaign, while those who do not must be aroused more strongly in order to accept a pro-conscription view.

Another change in the "pro" group that might be noted here is a decrease in religious references (10% to 3%) as well as a decrease in statements about sayings and intentions of Hitler (10% to 3%). In the "anti" group, on the other hand, the percentage of religious references rises (5% to 12%), and no references to sayings and intentions of Hitler are made during the period. The shifts in the percentage of religious references can in all probability be explained by the changing sex and socio-economic composition of the groups. There is also a slight increase in the percentage of both pro- and anti-Roosevelt references in the "pro" group, as well as a more substantial increase (0 to 10%) in the anti-Roosevelt references in the "anti" group. This may indicate increased signs of activity on the part of Roosevelt, and may be only incidentally related to the bombing of England.

One other point that might deserve brief comment concerns references to public opinion. In the "pro" group there is an increase of from 70% to 80% in the proportion of those who do not cite authorities in connection with their arguments. There is also a substantial decrease in the percentage of those who cite "many, most Americans" in support of their views (20% to 4%, as well as in the proportion of those who cite "friends, district, neighbors" (15% to 4%). The proportion of those who refer to "many, some kind of Americans" and of those who refer to the polls increases negligibly (5% to 6%) and (0 to 6% respectively), while the proportion of those who make no reference at all to public opinion shows a substantial rise (65% to 84%).

No such pattern is indicated, however, in the anti-conscription group. Here the percentage of those who do not cite authorities remains constant (88%), the proportion of those with no references to public opinion drops slightly (76% to 73%), while the percentage of those who refer to "many, all Americans" shows a substantial increase (5% to 15%) and the percentage of references to "many, some kind of Americans" shows a negligible drop (10% to 7%). These results can probably be explained on the hypothesis that support from public opinion or authority is less likely to be sought if the chances of winning the argument appear stronger. Increasing seriousness of the war situation has ap-

parently made the writers on both sides feel that the likelihood of the bill's passage had increased with the bombing of England.

### CONCLUDING REMARKS

The results of the present study indicate that the frequency of mail, the composition of the letter-writing group, and the content of the communications sent to the two test Senators during the conscription debate have all varied as a function of the changes in the political situation. The gross frequency of the mail seems to have a direct relation to the seriousness of the situation. The relationship of the situation to the composition of the letter-writing group and to the content appears to be of a more complex nature. While the full significance of these relationships is not clear, the regularity of the observed patterns suggests strongly that letter-writing is a significant form of political behavior.

In the interpretation of these results stress must be placed on the fact that they represent primarily a reaction to a specific issue under a specific set of historical conditions. Had a different issue been involved, the time distributions of, say, the sex of the writers might have been quite different. Whatever psychological generalizations are made on the basis of the data must, therefore, take specific historical conditions into account.

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### ANNOUNCEMENTS

An American Society for Psychodrama and Group Therapy has been formed which held its first meeting on May 21, 1943, at the Psychodramatic Institute, New York, N.Y. Officers elected: J.L. Moreno, President; Frederic Feichtinger, Secretary.

The symposium on Sociometry is to appear in the August issue. It will contain papers from: Read Bain, Miami University; Howard Becker, University of Wisconsin; Merl E. Bonney, North Texas State Teachers College; E.W. Burgess, University of Chicago; F. Stuart Chapin, University of Minnesota; Joan H. Criswell, Washington, D.C.; Stuart C. Dodd, American University, Beirut, Syria; Henrik Infield, Rural Settlement Institute; Helen H. Jennings, Sociometric Institute; Leona M. Kerstetter, Young Women's Christian Association; Paul F. Lazarsfeld, Office of Radio Research; George A. Lundberg, Bennington College; J.L. Moreno, Sociometric Institute; Gardner Murphy, College of the City of New York; Stuart A. Queen, Washington University; Maria Rogers, Committee on Autonomous Groups; Irwin T. Sanders, University of Kentucky; Dwight Sanderson, Cornell University; Pitirim A. Sorokin, Harvard University; Leslie D. Zeleny, United States Army Air Corps; Florian Znaniecki, University of Illinois.

The Elgin State Hospital Messenger of May 1943 announces the establishment of a psychodramatic clinic at the Elgin State Hospital at Elgin, Illinois, under the direction of Dr. Theodore R. Sarbin of the University of Chicago.

## BOOKS RECEIVED FOR REVIEW

Howard Becker and Reuben Hill, MARRIAGE AND THE FAMILY, D.C. Heath & Co., 1942.

Margaret Mead, AND KEEP YOUR POWDER DRY!, William Morrow & Son, 1942.

Gregory Bateson and Margaret Mead, BALINESE CHARACTER, New York Academy of Sciences, 1942.

Maurice H. Krout, INTRODUCTION TO SOCIAL PSYCHOLOGY, Harper & Brothers, 1942.

William E. Vockery and Steward G. Cole, INTERCULTURAL EDUCATION IN AMERICAN SCHOOLS, Harper & Brothers, 1943.

L. L. Bernard & Jessie Bernard, ORIGINS OF AMERICAN SOCIOLOGY, Thomas Y. Crowell Company, 1943.

Theodore M. Newcomb, PERSONALITY AND SOCIAL CHANGE, Dryden Press, 1943.

## MAN IS THE MEASURE...

Read Bain  
Miami University  
Oxford, Ohio

Black and White - It probably would warm the cardiac cockles of all Chambers of Commerce to learn that our town has grown steadily for nearly a hundred fifty years. In 1940, it had 2756 living souls! This would doubtless cause those C. of C. calescent cordiform corpora to congeal to chunks of ice and clink in caustic contempt. No matter—our town is not commercial; it has been a state-supported "university" since 1824—strictly "For Men Only" until 1892 when the catalog announced women could register but it also mentioned the two "excellent female seminaries" in the village and implied that all proper young women would go there to matriculate. One of these, founded in 1853 by disciples of Mary Lyon, still survives and purveys proper pedagogical provender to about 300 proper young ladies. It is a beautiful little college with spacious grounds covered by tall elms and beeches. The enrollments of the two colleges exceed the population of the town by almost 1000.

About 600 of the 2756 villagers are Negroes. Few attend the university and none, the women's college. Before the War Between the States, many Southerners came to the "University" (actually an arts college until 1906) then widely known as "The Yale of the West." In 1855, it was reputed to have a larger cash income (exclusive of tuition) than any college in the country. This \$5500 was rental from the township set aside for its support by the Ordinance of 1787. Many southern students brought servants to care for them and their horses. Some of these Negroes remained in town by purchase, or returned by way of the "Underground" which had a station in the village, or came back after the War. Some who never came back doubtless left their mark on the vital statistics since there were some free Negroes in town as well as some slaves of citizens. Many of the Negroes still in town bear



the names of fine old southern families. Some of the college teachers and citizens were active Abolitionists. This tended to increase the number of free Negroes in the town. When the first president, Robert Hamilton Bishop, was forced to resign in 1841, one of the charges against him was his antislavery sentiments. He was a dour and durable Scot and a great educator. His ideas were far ahead of his time; he was something of a "higher critic"; an outspoken opponent of war; a man of "large and liberal ideas," as he exhorted his students to be. L. L. Bernard classifies him as one of the leading "pre-sociologists." As a thinker, teacher, educator, and man, he was a giant compared to his much better known but petty and trouble-making colleague, William Holmes McGuffey. Many Negroes trace their history back to the "Bishop Period" which was the Golden Age of the University until after World War I.

Most of the Negroes live on the edge of town in shacks and hovels. Some own good homes in the center of the village and are substantial citizens by any standard. The Negro community is very class conscious. Status depends on such factors as family history, for whom they work, color, length of residence, church affiliation, and individual traits. Working for the University gives high status and some jobs, such as janitors in principal buildings, first and second cooks, and maids in dormitories, give much higher status than other types of work. Working for the "right" people in town also counts but it is not clear whether "town" outranks "gown" in this respect. Probably some faculty families outrank most village families, and vice versa. The "social distance" between some Negroes and some whites is much less than that between some Negroes and other Negroes. Many whites, both town and gown, would rank some Negroes far above some whites.

It probably would shock President Bishop, and possible even the sanctimonious McGuffey, to know that the University Training School, named for the Reader writer (or rather, compiler) excludes Negro children despite the fact that the teachers who teach teachers to teach are training men and women for service in mixed schools throughout the state and nation. Aside from this, the University makes no formal discriminations against Negroes; they may live and eat in dormitories; play on all teams; join all clubs including the A.A.U.W. (but not "white" fraternities); attend University dances and other college functions. They suffer

no academic disadvantages except exclusion from "practice teaching" in the Training School. This costs them considerable money, time, and inconvenience. There is no University rule against Negroes, either with reference to practice teaching or attendance. When the school was organized, nearly forty years ago, it probably could not have gotten enough children to start if Negro children had been permitted. Their exclusion became a "custom" which is now very difficult to change. Of course, Negro University students suffer the many subtle slights and discriminations which our "democratic Christian" culture visits upon all Negroes.

In the village, things are different. Negroes must sit in one corner of the movie; stay away from the municipal pool, though many pay taxes; keep off the golf courses, even as caddies; not eat in restaurants; not attend white churches, except Catholic and Nazarene though very few are members of these churches; must accept lower pay than whites for similar work. In general, they are expected "to know their place and stay in it," i. e., accept low status and inferior roles with meekness and patience, do menial manual work for small pay, and treat all whites as "superiors." One of my colored students said, "A colored girl has to be twice as careful as a white girl or she will be talked about."

By any criterion you choose, including color, many whites in the village are "inferior" to some Negroes, i. e., have more or less of the trait in question. Some whites are darker, dumber, drunker, drabber, more dishonest and disreputable than many Negroes. Few Negroes are so stupid or servile that they cannot apply the "principles we are fighting for" to their own case. So restlessness and tension grow apace.

Item: Some Negro boys entered a restaurant much frequented by white students. The Greek proprietor refused to serve them and finally chased them out at the point of a gun. The colored boys wanted to have him arrested but the Mayor talked them out of it.

Item: A couple of colored boys sat in the "center section" at the movie. An usher told them to get out. They would not. The usher persisted, pulling at their clothes. One of the Negroes told the usher, "Keep your hands off or I'll let you have it." The usher grabbed his necktie and the colored boy "let him have it," knocking him cold as a wedge. The manager claimed he had not

told the usher to put the Negroes out and the owner refused to prefer charges.

Item: In a nearby town, a colored woman called for coffee in a bus station. The waiter served it down at the end of the counter away from the white customers. The colored lady insisted on having it served where she sat. The waiter finally had her removed by a cop.

Item: A local church invited a colored man to discuss Negro problems and considered asking colored people to attend. It was decided not to do so, however, because "Some of our very nicest people would not come if they knew colored people were going to be present."

Item: A little girl asked her Sunday School teacher (in another church) why there were no colored children in the class. The teacher replied, "They really wouldn't be happy here and besides, you know, they have their own churches." The Negro janitor of this church is one of the finest men in town but he "merely works there"; he worships God elsewhere with his own "kind."

Item: When the WPA nursery school was being organized, it had to be segregated. The very competent Negro teacher took charge of the white school one day when the regular teacher was ill. The next day no white children showed up; their mothers were greatly incensed. The Negro mothers supported the nursery school much better than the white mothers did.

However, there are signs of sanity and justice in our town. Race relations in the village grade and high schools are apparently satisfactory. Plans are well along for a Negro playground and community center. (This is "segregation," of course, and has been in the "planning stage" much too long.) Colored boys were served in another restaurant a few days after the Greek gun-play episode. The University has handled the problem very well except for the Training School. The University does not like this situation but recognizes that it is a delicate matter which needs careful handling. It is hoped something can be done about it soon. Many faculty people treat their Negro and white employees alike except for paying the Negroes less, because the Negroes are "worth less." The fact is there is an oversupply of Negro and an undersupply of white domestic labor. Negroes have equal educational opportunities

(except for the Training School) and their right to vote has never been infringed. Mutual respect between many Negroes and whites is found throughout the village.

Thus, we are not likely to have any postwar race riots in our town though more "incidents" may occur. During the past fifteen years, almost no Negro-white altercations have occurred: whites fight whites; Negroes, Negroes. This has been true because Negroes have been more conscious of their "place" than they are likely to be in the future. The tension is growing. The social class organization both within the Negro community and the Negro-white community is being seriously disturbed by the pressures of the war.

There probably will be many race riots in the country during and after the war unless proper preventive steps are taken soon. After World War I, there were some race riots, mostly in the Border Cities; Chicago and Detroit were the main exceptions. A colleague told me he recently saw white and colored girls swimming in the same pool at one of the Chicago Junior Colleges. Perhaps Chicago learned a lesson from the Black Days of 1919. Other cities, north and south, should be learning the same lesson now. It is highly probable that more of the postwar violence will occur in the South than was the case after World War I.

Recent studies of southern Negro youth clearly show that young Negroes do not "know their place" so well as their elders do; they are bitterly discontented; the North is their Mecca, "getting ahead" is their goal; they want decent wages and a fair chance to work, study, and play; they are ambitious and resent their continued frustration. If there is a large northward migration and increased cityward migration in the South, if racism, Jim Crowism, segregation, denial of educational and political rights continue, if labor leaders and employers remain anti-Negro — in short, if the South continues to violate the democratic and Christian ideals for which we — and the Negroes — are fighting, we may look for blood on the Southern Moon and murder among the magnolias. While the hearts of the southern whites are black, northerners are by no means angel-hearted. They too may learn that black and white blood has the same color. When they are pricked, do they not bleed?

Thirteen million Negroes will not forever take it lying down. The ghosts of dead slaves and Negro boys slain all over the world, the great sad ghost of Lincoln, and the ghosts of all who died in the War Between the States will rise to haunt our Postwar Banquet of the Four Freedoms unless we keep faith with our brunet brothers. If we fail, our fight for the Four Freedoms fizzles into tragic farce. If we sin too long against democratic decency, blood will flow. Must we continue forever to solve our social problems the hard way, the costly way — by blood, bludgeon, and burning?

The problem is simple. The Negro does not ask much: merely to be treated like any other citizen, to be judged on his merits as a person; an equal chance to work, study, play, and speak; to live where he will and go and come as he chooses. He does not want "to marry your sister" or force you to invite him to dinner. He does not want special privileges. He does not object to a poll tax, educational, or any other voting qualifications so long as the requirements and the opportunities for meeting them are applied equally to black and white. Responsible Negro spokesmen do not ask for more; they cannot ask for less.

During and after the war, we shall have two golden opportunities to keep faith with those who die. One is as simple as Black and White. The other is more complicated and more important because it is bound up with the solution of the Negro and many other problems. The second great opportunity is to bring order and justice out of the chaos and cruelty of our economic life. Shall the Many continue to labor for the benefit of the Few? Shall Private Profits continue to loom larger than Personal Lives? Shall many endure poverty that a few may enjoy luxury? Will otherwise kindly and intelligent men continue to choke at the thought of \$25,000 net incomes? Shall employers continue to be Fuhrers, and labor leaders, czars? Can those who possess be healthy and happy in the presence of the poor who sicken and sorrow? Can cultural cannibalism continue? Can men destroy their kind without finally destroying themselves?

Lincoln was right when he said, "This Nation cannot endure half slave and half free." It is equally true that this Nation cannot long survive ten percent rich and ninety percent poor.



The Black and White problem is merely one aspect of the larger question of status and opportunity. How democratic does a "democratic" society dare to be? How free and equal can we become? Will the Four Freedoms flourish or will they become the Four Fatal Frauds?

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